



BRITISH RED CROSS SOCIETY

TRAINING MANUAL

No. 3

Issued with the Approval of the War Office

By

JAMES CANTLIE

A., M.B., F.R.C.S., VD.

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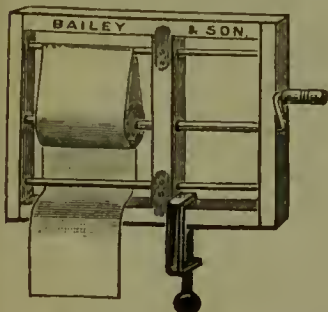
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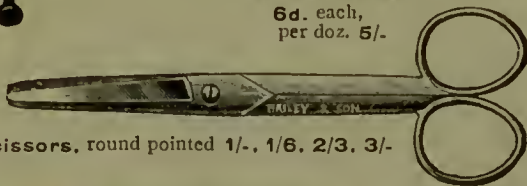
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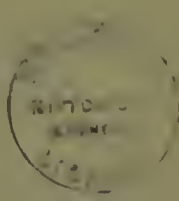
James Cantlie, M.A., M.B., F.R.C.S., VD.

Hon. Surgeon-Colonel, R.A.M.C. (T.F.)

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THE
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THE British Red Cross Society is the outcome of the fusion of the late "British National Society for Aid to the Sick and Wounded in War," which was founded by that gallant soldier the late Lord Wantage, V.C., and the "Central British Red Cross Council," his late Majesty King Edward VII. having considered it desirable that the Red Cross Movement in the Empire should be represented by one Society, which should co-ordinate all such associations as are concerned with the succour of the sick and wounded in war.

The Society was inaugurated at a meeting held at Buckingham Palace on the 17th of July, 1905, under the presidency of her Majesty Queen Alexandra.

The Society was granted by his late Majesty a

Royal Charter of Incorporation by Letters Patent under the Great Seal on the 3rd of September, 1908.

The work of the Society in the United Kingdom is organised and carried out mainly through the medium of County Branches, the President of each respective branch being the wife of the Lord Lieutenant, or some person nominated by him. The President of every respective Colonial Branch is the Governor, or some person appointed by him.

The primary object of the Society is to furnish aid to the sick and wounded in time of war. Such aid must necessarily be supplementary to that provided by the Medical Departments of the Navy and Army. It is assumed that upon those two departments rests the responsibility of providing for the casualties of war, and the Society only professes to offer such additional comforts and such general help as may be considered beyond the reasonable scope of the official bodies.

The Admiralty and War Office have accorded their official recognition to the British Red Cross Society as the organisation responsible for the Red Cross movement throughout the Empire, and have agreed that in time of war all voluntary offers of assistance made in Great Britain and Ireland shall reach them only through the channel of the Society, other than those coming from or already arranged with, the Ambulance Department of the Order of St. John and the St. Andrew's Ambulance Association for the supply of certain personnel.

It is a further object, therefore, of the British Red Cross Society to examine, systematise, and co-ordinate all offers of help, and, by preventing waste and overlapping, to render them of the utmost possible value.

Since the inception of the original Society in 1870 to the present year, 1912, a sum of nearly £500,000 has been expended by the Society in assisting the

sick and wounded in war. Of this large sum £162,296 was expended in aid of the sick and wounded during the South African War, 1899-1902.

The Secretary of State for War issued on August 16th, 1909, to Territorial Force Associations in England and Wales, a "Scheme for the Organisation of Voluntary Aid for Sick and Wounded," in the event of war in the Home Territory. Full details of this scheme are contained in the Society's Form D.

In this "scheme" a county system has been adopted because it is the one upon which the Territorial Force is organised, and which the British Red Cross Society has adopted as the basis of its constitution; and the Society is the body recommended by the War Office to the Territorial Force Associations for the carrying out of this important work.

The Medical Service of the Territorial Force has no establishment for carrying out the duties in connection with (a) Clearing Hospitals, (b) Stationary Hospitals, (c) Ambulance Trains, and (d) other formations, viz. Entraining and Rest Stations, Private Hospitals, and Convalescent Homes.

In order to provide a personnel that will be available for any or all of the duties indicated, Voluntary Aid Detachments are organised in each county, consisting respectively of men and women, as follows:—

MEN'S DETACHMENT.

1 Commandant.

1 Medical Officer.

1 Quartermaster.

1 Pharmacist.

4 Section Leaders.

48 Men (divisible into four sections of 12 men
— each).

Total 56

WOMEN'S DETACHMENT.

1	Commandant (man or woman, and not necessarily a Doctor).
1	Quartermaster (man or woman).
1	Trained Nurse as Lady Superintendent.
20	Women, of whom 4 should be qualified as
—	cooks.
Total	<u>23</u>

Each detachment as it is formed and approved is registered by the Council of the British Red Cross Society, is given a consecutive number by the War Office, and forms part of the Technical Reserve, and is inspected annually by an Inspecting Officer detailed by the War Office.

The Society's uniform may be optionally worn by members of detachments, and the regulations in regard thereto are included in the Society's Form D (7).

The War Office having approved the certificates granted by the Society in First Aid and Nursing, the Red Cross Branches are empowered to form classes and hold examinations in these subjects, in order to qualify candidates who do not already possess such certificates for admission to detachments. (For details, *see* Form D (4)).

The **Men's Detachments** must be thoroughly trained as stretcher bearers, and to some extent as male nurses. A certain proportion of clerks, carpenters and mechanics would be especially useful. The principal duties of the personnel would consist in carrying sick and wounded by stretchers, and, when necessary, in preparing means of transport by road or rail, in converting local buildings or whole villages into temporary hospitals, and in disinfecting buildings, etc.

The **Women's Detachments** would be employed chiefly in forming Railway Rest Stations for preparing and serving meals and refreshments to sick and wounded during transit by railway, and in taking temporary charge, in the evacuation stations or temporary hospitals, of severe cases unable to continue the journey. They should, therefore, be trained not only in cooking and the preparation of invalid diets, but also in the method of arranging small wards for patients in suitable buildings, preferably near a railway station, and in such nursing as is necessary for the temporary care of patients until they can be transferred to the general hospitals. Detachments, or a certain portion of a detachment, may be employed for duty in ambulance trains.

Each member of a detachment when called up for service will be provided with an identity certificate and a "brassard" or arm badge bearing the Geneva Cross. The identity certificate and brassard will be issued by a responsible officer of the Army. The wearer of the brassard so issued is "protected" under the articles of the Geneva Convention.

It may be mentioned that enrolment as a member of a Red Cross Voluntary Aid Detachment does not render such individual a member or associate of the British Red Cross Society. The conditions for admission as such are detailed in Form A, copies of which may be obtained from the Society's offices.

Since the publication of the above "Scheme" the British Red Cross Society has been very active in the organisation of Voluntary Aid Detachments, and by the 31st of March, 1912, the Society had raised, and registered at the War Office, 1,208 Red Cross detachments with the total personnel of 35,772.

By the Geneva Convention Act, 1911, "it shall not be lawful for any person to use for the purposes of

his trade or business, or for any other purpose whatsoever, without the authority of the Army Council, the heraldic emblem of the red cross on a white ground formed by reversing the Federal colours of Switzerland, or the words 'Red Cross' or 'Geneva Cross.'"

The British Red Cross Society has the authority of the Army Council to use the heraldic emblem of the red cross and the words "Red Cross."

The official badge of the Society, with the emblem of the Society as a circular pendant attached to an ornamental bar lettered with the name of the respective county, may be worn on the left side by those who belong to any branch of the Society or its Voluntary Aid Detachments so long as a connection with the branch is maintained. This badge is only issued, in accordance with the Society's regulations, on the nomination of its branches.

Detailed information of the organisation and objects of the Society may be obtained on application to the Secretary,

FRANK HASTINGS,

9, Victoria Street, London, S.W.,

to whom all communications should be addressed.

PREFACE

THROUGHOUT the world the Red Cross is the emblem which proclaims to the sick and injured, in peace and war, comfort in distress and relief in suffering. Men and women of every civilized nation are organized for this purpose, and in the British Empire the beneficent work is centred in the British Red Cross Society. However well equipped the civil, naval and military medical departments of any country may be, in times of stress they prove inadequate to the enormous work thrown suddenly upon them, owing to calamities occasioned by disease, by natural forces of sea and land, by war, or by the accidents incidental to modern developments in machinery and means of travel. Voluntary aid is therefore necessary to supplement and assist the organized medical services both in personnel and in material.

The British Red Cross Society was formed to organise voluntary aid service amongst men and women, fitted by their training to render efficient help to the medical department of the Public Services of the country when occasion demands, and to encourage systematic instruction in all branches of Red Cross work.

Manual No. 3 of the British Red Cross Society's publications is intended to guide those who have already acquired a knowledge of First Aid and Nursing, to act collectively in carrying out Red Cross work, to accustom them to discipline, by which alone efficient

service can be rendered, and to stimulate them to exercise their initiative and resourcefulness in constructing and applying improvised means of providing help, shelter and transport for the sick and wounded in emergencies. The Manual is meant to be primarily a guide to the direction in which training in improvised methods of assistance to the sick and wounded is to be carried out; but some of the details of fulfilling the suggestions made in the text are left to the energy, the ability and forethought of those who devote themselves to humanitarian work under the Red Cross.

I am indebted to many for valuable help and advice in preparing the manual. Of these I specially wish to thank Sir Frederick Treves, Bart., G.C.V.O., C.B.; Frank Hastings, Esq., Secretary of the British Red Cross Society; and Miss M. M. Mitchell, M.C.A., for valuable help in preparing the chapter on Cookery.

The articles on Drill were revised by Sergeant-Major French, R.A.M.C.

JAMES CANTLIE:

November, 1911.

THE
British Red Cross Society's
MANUALS

By JAMES CANTLIE, M.A., M.B.,
F.R.C.S., VD.
Hon. Surgeon-Colonel, R.A.M.C. (T.F.)

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TRAINING MANUAL

CHAPTER I

INTRODUCTORY

MILITARY AND CIVIL AMBULANCE

ALL civilised nations have taken steps to provide means of relief for their sick and injured in peace and war. Hospitals, both civil and military, house the sick and injured in time of peace ; these we are familiar with in our towns and at our permanent military camps. In time of war, however, hospitals are temporary establishments, located under any available shelter, it may be in tents, in public buildings, outhouses, improvised huts, or screens, where the sick and wounded are kept under treatment until they are capable of being moved to more permanent quarters. The conveyance of the injured from the place where they were incapacitated, be it the street, the factory, the mine or the battlefield, has in modern times received an amount of attention unknown to our predecessors. This important development has come to be known as "ambulance work," and in both civil and military life it has attained marked precision and elaborate organisation. By ambulance organisation is meant the several arrangements, naval, military, and civil, by which appropriate treatment and transport are provided for the amelioration of the condition of the sick and injured up to the time of their arrival at permanent hospitals or at their homes.

Military ambulance in the Regular Army is provided for by the Royal Army Medical Corps (R.A.M.C.), and in the Territorial Force by the Field Ambulances of the Royal Army Medical Corps (R.A.M.C., T.F.).

Civil ambulance work in Great Britain is undertaken by the municipal ambulance systems and by ambulance associations.

It would appear at first sight as if in this country we were completely provided with all that is necessary for both military and civil ambulance work. Closer inquiry, however, shows that this is not so.

The Regular Army is equipped in every particular for the needs of an oversea expeditionary force. Our civil ambulance organisation is in a forward and even a pre-eminent condition compared with that of other countries. The Territorial Force, however, lacks one important branch of ambulance work—namely, the care of the sick and wounded in rear of the immediate field of battle; and as it is with the Medical Department of the Territorial Force that the newly created Voluntary Aid Detachments are to be associated in their work, it is necessary to understand something of the work of that department.

THE GAP IN THE MEDICAL DEPARTMENT OF THE TERRITORIAL FORCE

The Territorial Force is intended for home defence, and is organised on the county basis. County Associations, in direct touch with and under the control of the War Office, deal with the Territorial troops in their localities, including, of course, the Medical Department of the Territorial Force. The Field Ambulances of the Force are sufficient to meet the immediate requirements of the troops on the march and in action; but they have no men to spare to remain behind to attend to the sick and injured along the line of communications between the front and the base, where permanent hospitals are prepared for their reception. It is with the intention of meeting this gap in the medical organisation of the Territorial Force that the Voluntary Aid Detachments have been formed (Fig. 1). The word "gap" best expresses this deficiency, for, whilst the Medical Department of the Territorial Force (R.A.M.C., T.) is completely equipped by virtue of its field ambulances for work at the front, it has also hospitals in the larger towns, with a staff of medical officers, nurses, cooks, and

orderlies, organised and equipped for the reception of men brought from the front. The only gap, therefore, to be filled up is that between the seat of action and the large town, in other words, between the "Field Ambulances" at the front and the General Hospitals at the "base." The Voluntary Aid Detachments required to fill this gap were called into being by the military authorities as necessary to complete the

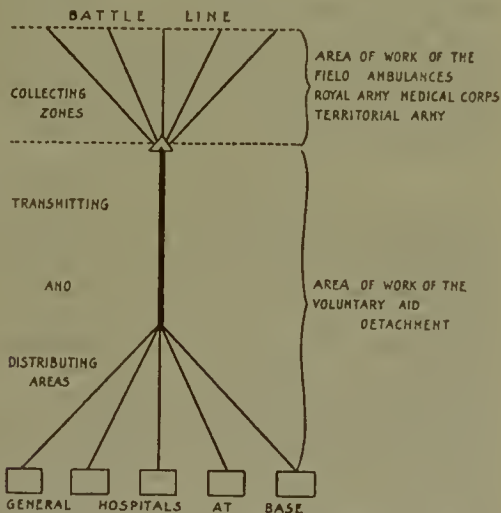


Fig. 1.—Showing area of work of Voluntary Aid Detachments.

Medical Department of the Territorial Force, and the British Red Cross Society offered to accomplish this object. In the War Office "Scheme for the Organisation of Voluntary Aid" (Dec., 1910), County Associations are "recommended to delegate the formation and organisation of detachments to the British Red Cross Society, which is prepared to carry out the scheme on the lines suggested herein, and which is the only body that the War Office is prepared to recognise for this purpose in cases where Associations do not directly undertake the work" (para. 15).

The British Red Cross Society is the successor to the late National Society for the Aid of the Sick and Wounded in War, usually styled the "National Aid Society."

It became evident that some central organisation responsible to the War Office authorities should be established to bring together the several "ambulance" societies in Great Britain, so that, in the event of a war of defence, those trained under the auspices of these societies should be at once available, and the British Red Cross Society took up the work of co-ordination and of organising all available voluntary aid in Great Britain in order to alleviate the condition of sick and injured men in time of war.

PRELIMINARY TRAINING

Certificates.—Candidates for admission to Voluntary Aid Detachments must, in the case of men, possess a First Aid certificate from some one of the bodies recognised by the War Office as qualified to issue such certificates. In the case of women a nursing certificate in addition to the First Aid certificate is required. It is advisable, although not compulsory, that men also should possess the nursing certificate.

The War Office having approved the certificates in both "First Aid" and "Nursing" granted by the British Red Cross Society, any branch of the Society desiring to hold classes and examinations in First Aid and Nursing is empowered to do so in conformity with the procedure laid down in the British Red Cross Society's Form D (4). This form may be had on application to the Secretary, British Red Cross Society, 9, Victoria Street, London, S.W.

The work of the Voluntary Aid Detachments is varied, and involves training, organisation, and improvising. The members are expected to serve as bearers, to render first aid, to pitch tents, to assist the surgeons at operations, to understand the meaning of and practically be able to carry out sterilisation in all its details, to be nurses, and to include in their number, if possible, pharmacists, cooks, carpenters, tailors, telegraphists, telephonists, cyclists, chauffeurs, blacksmiths, &c.

Physique of Ambulance Bearers.—It is a mistake to think that ambulance work is light and that the less physically strong can be recruited for it. To place a man upon a stretcher, to carry the stretcher, say, 500 yards or a mile or more, and to place it in or remove it from an ambulance waggon, requires a man of sturdy frame. Moreover, the work of the Ambulance Corps is not over when the battle ends. The soldier can lie down and rest, but the men of the Ambulance Corps have not only had to undergo the fatigue of the day during the fight, but when that is over they must look forward, if the engagement has been a severe one and there are many wounded, to twenty-four or forty-eight hours' continuous work before the front is cleared.

In recruiting for the Voluntary Aid Detachments no one should be admitted under 17 years of age. It is unwise to ask growing lads under 17 to carry a loaded stretcher. The chest measurement of an ambulance recruit who is to serve as a bearer should not be under 32 inches.

Further Training Necessary.—The preliminary training in first aid and nursing, although sufficient to obtain enrolment in Voluntary Aid Detachments, is inadequate to meet the wants of military ambulance work. For this purpose further training is requisite, for, unless help is systematised and organised in time of peace, the assistance capable of being rendered, even by those possessing a knowledge of first aid and nursing, is practically useless in time of war.

To begin with, it is necessary to have some knowledge of ordinary drill, so as to be able to carry out stretcher drill, waggon loading, etc. Seeing that ambulance work in the field requires provision for the formation of a "camp" of a kind, it is necessary that camp life and the sanitary methods requisite for its conduct be understood and practised. Acquaintance with methods of improvising means of transport, with means of accommodating the sick and wounded in temporary hospitals, and the ability to make the best of whatever materials are to hand, are the essence of Voluntary Aid Detachment work; this requires intelligence and initiative on the part of every member of a detachment.

CHAPTER II

RECRUIT DRILL

WHEN candidates who have never had any instruction in drill join a Voluntary Aid Detachment it is necessary to teach them the simple turnings, formation of fours, and marching to a flank, etc. Elaborate infantry drill is not required, but certain movements it is essential to know, otherwise the appearance of willing helpers in the time of stress is more that of a mob than of an organised body, and their efforts are calculated to impede rather than promote the welfare of the sick and wounded.

It is expedient that women should learn the simple movements necessary to enable them to move and act together. When engaged in ambulance work women may be called upon to draw up in line, to march two or four abreast when going from place to place, etc. It is well also to be acquainted with the discipline which drill entails.

All commands during drill are preceded by a word of "warning," such as "Squad," "Company," "Parade," "No. 1," etc. Instead of the command "Attention," "Stand at Ease," etc., it is "Squad — Attention," "Company — Stand at Ease," "No. 1 — Halt," etc. The words of command are alone given below, so as to save space, but a "warning" is to be understood and to be given before each. Further, the rule is **never move until the final word of command is given.**

When a number of men (or women) are assembled, on receiving the word of command "**In Single Rank — Fall In,**" the instructor selects one man to be the right-hand man of the line, and the others fall in on his left.

Sizing. — "**Tallest Right — Shortest Left — Size.**" According to their height the men take up their places, passing by the rear of the line to reach their proper

positions. Instruction is then given in the following exercises:—

“Stand at Ease.”—Carry the left foot about 12 inches to the left; rest equally on both feet; at the same time carry the hands behind the back and place the back of one hand in the palm of the other. It is immaterial which hand grasps the other.

On “falling in,” the position of “Stand at Ease” is taken up on all occasions.

“Attention.”—Bring heels together and in line; turn toes outwards at an angle of 45 degrees; keep head erect, chin retracted, shoulders squared and knees straight; arms hanging loosely by the side with fingers lightly touching thighs. Look straight forward, with eyes looking their own height.

“Number.”—Commencing on the right, the men call out “One,” “Two,” “Three,” etc., consecutively, until all are numbered.

To see that the recruits know their numbers, it is well to prove them by giving the words of command, “Odd Numbers—Stand at Ease,” “Even Numbers—Stand at Ease,” “The whole—Attention.”

“Right Dress.”—No. 1 looks straight to his front, each of the others turns head and eyes to the right and moves by shuffling the feet backwards or forwards as required, until the lower part of the face of the second man from his right is just visible. The line may be similarly dressed from the left.

“Eyes Front.”—Turn head and eyes smartly to the front.

(As the knowledge of drill increases, the command “Eyes Front” is dispensed with, the men looking to the front as soon as the dressing is complete without further word of command.)

FORMATION IN TWO RANKS

“Even Numbers Two Paces Step Back—March.”
—The even numbers 2, 4, 6, etc., take two paces of 30 inches backwards, commencing with the left foot.

“On the Right Close.”—No. 1 in the front rank stands fast; each of the others takes short paces to the right until adjacent to his right-hand man. The

rear rank men cover off (i.e. stand behind) the front rank men immediately before them.

(As drill becomes more familiar, the ranks, after the rear rank takes two paces back, may be "closed" on the command "Right Dress.")

"Number."—When in two ranks the front rank alone number off. The rear rank men take the same number as the front rank men immediately in front of them.

FILE

When the men are drawn up in two ranks, the front rank man and the man immediately behind him constitute a file.

Odd numbers are Right Files.

Even numbers are Left Files.

To ensure that the recruits understand their positions, it is well to give the commands: "Right Files—Stand at Ease"; "Left Files—Stand at Ease"; "The whole—Attention."

EXTENDING FOR TURNINGS

"Odd Numbers Front Rank—Two Paces Forward; Even Numbers Rear Rank—Two Paces Step Back—March."—All the numbers named take two paces in the directions indicated, starting with the left foot. The squad is now in four ranks, and the Instructor can readily see how each individual is executing his orders.

"Dressing at Intervals—Right Dress."—Right-hand men in the four ranks stand fast; the remainder turn head and eyes to the right and raise the right hand, palm upwards, straight out from the side, and adjust position to allow the tips of the fingers of the extended hand to touch the tip of the shoulder of the man on the right. This determines correct intervals and dressing.

"Eyes Front."—The extended hand is brought to the side, and the head and eyes are turned to the front.

"Right Turn."—Turn to the right on the right heel and left toe, then bring the left heel smartly up to the right. This may be taught by numbers, the Instructor adding the words "one" and "two" for the two parts of the movement until proficiency is attained.

“Left Turn.”—Turn to the left on the left heel and right toe. Bring the right heel smartly up to the left.

“About Turn.”—Turn to the right-about (face directly to the rear). When the Instructor repeats the command, a right-about turn is again made, when the bearer is once more looking to the front.

“Half Right Turn” or **“Right Incline.”**—As above described, but the bearer faces obliquely to the right.

“Half Left Turn” or **“Left Incline.”**—The bearer turns again to the front.

If these movements are to be frequently repeated the recruits may at any time be given a rest on the command—

“Stand at Ease.” (*See* p. 7.) And when this is followed by the command—

“Stand Easy,” the men, while standing at ease, may move their limbs in any position, but without shifting their ground, so that when called to attention the dressing will not have been lost.

When after an interval the drill is to be resumed, the squad is called to attention by the command—

“Squad—Attention.”—At the word “Squad,” when “standing easy” the men come to the position of “stand at ease,” and spring together to the position of attention on the word being given.

When the turning exercises are completed, the men are brought into line again by the command—

“Re-form Company—Quick March.”—The odd numbers of the front rank stand fast, the remainder step off with the left foot in quick time and take up their original positions in two ranks.

“Dismiss.”—On the command “Dismiss,” the men turn to the right, and after a pause quietly break off.

MARCHING EXERCISES

Length of Step.—The lengths of the various steps are as follow:—

30 inches	is the length of pace in quick-time marching.		
30 inches	“	“	“ slow-time marching.
33 inches	“	“	“ stepping out.
21 inches	“	“	“ stepping short.

"Double March."—Clench the fists, back of hands outward, half bend the elbows, incline the body forwards, and step on the toes. The length of pace in the double march should be 40 inches.

"Mark Time."—This is done (maintaining the arms and hands as when advancing at the double) as during the quick march, but at the double-march time.

"Quick."—When doubling, on the word "Quick" being given, the hands are dropped, and quick-march time resumed.

"Right Turn."—When on the march the order "Right Turn" is given, the men turn to the right on the left foot, and move on at once without checking the pace.

"Left Turn."—As above, but turn to the left on the right foot.

"Right Incline."—Make a half turn to the right, and move on in a diagonal direction.

"Left Incline."—Make a half turn to the left. On the command "Right Incline" being given, when the squad is in the position of left incline, the men turn to their front again, and continue the march.

"Halt."—On the word "Halt," the moving foot will complete its pace, and the other will be brought smartly up in line with it, without stamping.

"Stand at Ease."

CHANGING DIRECTION FROM THE HALT

(The squad is still in line in two ranks.)

After being called to attention, on the command—

"At the Halt—Right Form," the right-hand man of the front rank makes a full turn to the right, the remainder of the front rank a partial turn to the right. The rear rank stand steady until given the command "Quick March."

"Quick March."—All except the right-hand man step off and, glancing to the right, move by the shortest line to their places, halt and dress.

If it is intended to move forward in the new direction after forming, the caution "At the Halt" is omitted, the men mark time when formed, and the command "Forward" will follow.

CHANGING DIRECTION ON THE MARCH

"Right Form."—The right-hand man of the front rank turns to the right and marks time, the remainder make a partial right turn, move to the new alignment by the shortest route, marking time until all arrive in place, when the command "Forward" will be given.

These formations may also be practised for Half-Right Form, Left Form, and Half-Left Form.

FORMATION OF FOURS

1. When in line at the halt. On the command—

"Form Fours," the left files (even numbers) of both ranks step back a pace of 30 inches with the left foot, and take a side pace of 30 inches to the right with the right foot.



Fig. 2.—Movement to form fours.



Fig. 3.—Forming fours completed.

"Form Two Deep."—The left files take a pace to the left with the left foot and a pace forward with the right foot.

2. On the march. On the command—

"Form Fours," the right files mark time two paces whilst the left files are moving to their places as at the halt.

"Form Two Deep."—Right files mark time two paces, left files move into their places by the same steps as at the halt.

Forming Fours when moving to a Flank

1. At the halt. The line is in two ranks. On the word of command—

"Form Fours"—"Right" (or Left), the squad turn to the right (or left). When this is followed by the command—

“Left (or Right) Turn,” the squad turn to the left (or right) and form two deep.

2. On the march, when in two ranks.

Fours are formed to right and left as at the halt, except that the right files mark time to allow the left files to move into place.



Fig. 4.—Saluting.

WHEELING

When marching two deep or in fours to a flank, on the command **“Right (or Left) Wheel”** proceed as follows: If, for example, the command **“Right Wheel”** is given, the right-hand man of the leading section or file turns to the right and marks time.

The remainder of the leading section take a partial turn to the right and move up to their places in the new alignment. When in line the leading section step off. The remaining sections or files move up to the point at which the wheeling takes place and conform to the movements of the leading section. In drilling in a hall this command must be repeated as the corners of the hall are approached.

SALUTING

1. To the front. On the command—

“**Salute,**” bring the right hand with a circular motion to the right side of the forehead with the palm of the hand forward, tip of the forefinger one inch above the eyebrow. The thumb is kept close to the forefinger, the elbow in line and nearly square with the shoulders (Fig. 4).

2. To the side.

When passing an Officer in uniform, the salute will be made with the hand which is farther away from the Officer, and the head will be slightly turned towards him. The salute should be made three paces before approaching the Officer, and maintained until three paces after passing. When an Officer approaches, men sitting rise and stand to attention. If without caps, men on meeting an Officer turn head and eyes towards him and stand to attention—they do not bring the hand to the forehead.

CHAPTER III

STRETCHER EXERCISES

GENERAL REMARKS

THE following exercises have been framed for the instruction of bodies of men, with a view to the careful handling of the wounded and their transport on stretchers and in waggons. When the bearers have become thoroughly proficient in these exercises (in the drill hall or on the parade ground), the Instructor will take every opportunity of practising them under conditions as near as possible to those of field service. The squads should be exercised over rough ground, and each man taught the various means for the transport and carriage of the wounded. The important point to impress on every man is, that on mobilisation he may



Fig. 5.—Military stretcher to which pillow may be fixed at either end; see holes in canvas at foot of stretcher.

form the No. 4 of the stretcher squad, and so be responsible for the wounded man until he is brought directly under the notice of the Medical Officer.

It is advisable to wear knee-caps on the left knee at all exercises in which the men require to kneel.

Women ought to learn stretcher drill. Should a woman be in a country district with no available help except untrained country folk, it is expedient to be able to direct how a wounded man should be lifted, how an improvised stretcher can be put together, and how the stretcher should be carried. Women should not be allowed to carry wounded men on stretchers, unless there are six women bearers, one at each end of the

stretcher, and four more supporting the sides of the stretcher. (*See Chap. IV.*)

STRETCHERS

The parts of a stretcher are :

- | | |
|-----------------------|--------------------|
| 2 poles. | 1 pillow. |
| 2 traverses. | 2 shoulder slings. |
| 4 rollers or runners. | The stretcher bed. |

Military Stretcher (Fig. 5).—The poles are square, with rounded handles, and measure 7 feet 9 inches. The



Fig. 6.—Stretcher inverted, showing traverses.

traverses are the metal jointed bars on the under surface (Fig. 6) to keep, when opened out, the poles apart and the canvas taut. The rollers are of gunmetal or wood, 3 inches in diameter. The Mark II. stretchers have U-shaped pieces of metal in place of rollers (Fig. 6), and are now generally used. The canvas bed is 6 feet in length, and the total width of the stretcher is 1 foot 11 inches. Four

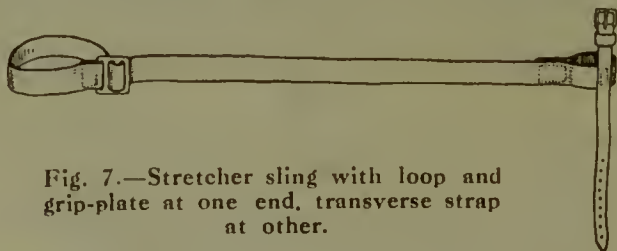


Fig. 7.—Stretcher sling with loop and grip-plate at one end, transverse strap at other.

eyelet holes at either end of the canvas (Fig. 5) are for the strings to be passed through to fix the pillow. (It will be observed that the pillow is attached to either end of the stretcher bed, whereas in stretchers generally used by the V.A.D. the pillow is fixed at one end.) The pillow is wedge-shaped (Fig. 5), and is kept in the ambulance wagon except when on actual service. (In

stretchers used by V.A.D's, the pillow will be found as a mere case fixed at one end, in which clothing, hay, straw, etc., may be placed when required.) The slings are of leather or tanned web (latest pattern); at one end of the sling is a loop provided with a buckle or grip-plate, whereby the sling can be lengthened or shortened, and at the opposite end is a transverse leather strap with buckle, used to fix around the stretcher when closed (Fig. 7). The weight of the stretcher is 34 lbs.

FORMATION OF STRETCHER SQUADS

Previous to the parade the stretchers will be laid in a heap on the ground.

The detachment will be drawn up in single rank, sized, dressed and numbered as already indicated (p. 6).

TO FORM INTO TWO RANKS FROM SINGLE RANK

Method I

The words of command are—

“Odd Numbers one pace forward—Even Numbers one pace step back—March.”—The bearers are now in two ranks.

“On the Right—Close.”—The bearers front and rear rank close on the right-hand man of the front and rear rank respectively, and cover off.

“Number.”—Front rank men alone call out the numbers; rear rank men take the number of the man immediately in front.

“Form Fours.”—Even numbers in front and rear rank take a pace to the rear with the left foot and a pace to the right with the right foot.

The bearers are now in *stretcher squads*.

Four bearers form a stretcher squad.

Method II

Another method followed by the R.A.M.C., and published in their manual, is as follows:—

After sizing in single rank the command is—

“Odd Numbers one pace forward—Even Numbers one pace step back—March.”—The odd numbers take one pace forward, forming the front rank; the

even numbers step back one pace, and now form the rear rank.

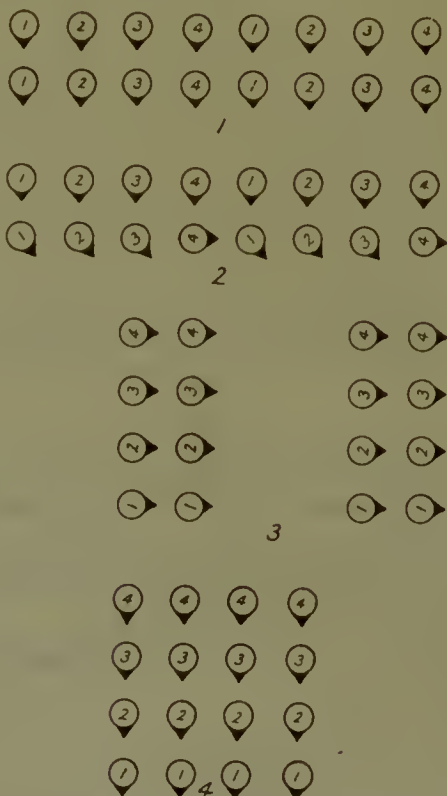


Fig. 8.—Forming Squads by the right. 1, Bearers in line ; 2, Left form; 3, Quick march; 4, Right turn, right dress.

“No. 1 Stand Fast—Ranks Right and Left—Turn.”—The odd numbers (front rank), with the exception of No. 1, turn to the right, the even numbers (rear rank) to the left.

“Form Company—Quick March.”—The whole, except No. 1, step off, even numbers (rear rank)

wheeling round to the right, and follow the left man of odd numbers (front rank). No. 3 forms up two paces in rear of No. 1; No. 5 on left of No. 1; No. 7 in rear of No. 5; No. 9 on left of No. 5, and so on. The leading man of the even numbers (rear rank) always forms up in rear rank during the formation of sizing into two ranks. As the bearers arrive in their places they turn to the left and take up their dressing in the new alignment.

By this formation the tallest bearers are on the flanks, the shortest in the centre.

FORMING THE SQUADS

“By Fours—Number.”—The front rank number by fours from the right, commencing at No. 1, the bearers calling out 1, 2, 3, 4; 1, 2, 3, 4; 1, 2, and so on. Nos. 1, 5, 9, 13 of the front and rear ranks of original alignment thus become Nos. 1 of squads. (Fig. 8, 1.)

“Squads at the Halt, Left Form—Quick March—Right Turn.”—No. 4 of each squad in front rank turns to his left, the remaining bearers of front rank make a partial turn to the left. The rear rank remain steady. (Fig. 8, 2.) On the word “March,” the whole, except No. 4, who stands steady, step off to their places in the new alignment (Fig. 8, 3); on the word “Turn,” all turn to the right.

The bearers are now in fours (stretcher squads).

“Right Dress.”—No. 1 of right squad remains steady, the remaining No. 1 bearers each take up position one pace from and in line with the bearer on the right; the other bearers (Nos. 2, 3, 4) place themselves one pace in rear of and covering the bearer in front of them (that is, 2 covers 1, 3 covers 2, and 4 covers 3 in each squad). (Fig. 8, 4.)

PROVING BEARERS

On the command, **“Front Rank—No. 1 Bearers—Stand at Ease. Second Rank—No. 2 Bearers—Stand at Ease. Third Rank—No. 3 Bearers—Stand at Ease. Fourth Rank—No. 4 Bearers—Stand at Ease,”** all the bearers in a rank, as the several ranks are named, stand at ease (Fig. 9).

A Section.—A bearer section consists of four stretcher squads. Though when a large number of men are present on parade the section is composed of four squads, still, when only two stretcher squads are on parade they represent, and are addressed as, a section.

"Sections—Attention." **"Number the Squads."**—No. 1 bearers number from right to left.

"Prove Sections."—No. 1 of the 4th squad raises the left hand level with the elbow, No. 1 of the 8th squad does the same, No. 1 of the 12th squad follows suit, and so on according to the number on parade.

"Left of Sections."—The No. 1 bearers with raised hands drop their hands smartly to the side.

"Number Sections."—Section commanders call out "One," "Two," "Three," etc., a commander is apportioned to each section of four (or less) stretcher squads; according to the number on parade, so there may be one, two, or more section commanders.

When a stretcher squad is told off for duty, and has to act by itself, No. 4 is in charge, and gives all words of command. Every

Fig. 9.—Proving bearers in bearer section.

stretcher bearer should have the opportunity of acting as No. 4 of his stretcher squad. It is the Commandant's duty to see that this is done.

Note.—Four bearers are assigned to a stretcher in V.A.D. ambulance work. Up to the time of the South African War four men to a stretcher was the recognised number, but owing to the long distances the wounded men had to be carried—many, many miles at times—on stretchers, it was found necessary to apportion six men to a stretcher. As the V.A.D. work is, however, presumed to be carried on in Britain, the necessity for six men to a stretcher is not so imperative. Further, as V.A.D. bearers meet at weekly or fortnightly drills only, it is well

to drill with as many stretchers as possible, and with four men to a stretcher each man can take a more active part in the work than when six are told off to one stretcher.

[For stretcher work, the forming of two ranks from single rank by the regulation infantry drill method on the command "Form Company" is totally unsuited for ambulance work, as the men thereby apportioned to the stretcher are of unequal height, the No. 1 bearer being taller than the No. 3 bearer, a fatal error, inasmuch as the patient's feet are higher than the patient's head. The best formation of all is to draw up the line in single rank, tallest *left* and shortest right, and then form them into two ranks as above. A much more "level" stretcher squad is thereby obtained, the shorter man being the No. 1 bearer. Officers in command of V.A.D. should practise this plan. The effect is at once evident.]

SUPPLYING STRETCHERS

The squads having been numbered and proved, and the sections numbered, the next step is to begin stretcher drill.

"No. 3 Bearers—Right (or Left) Turn—Supply Stretchers—Quick March."—At the word "March," the No. 3 bearers, with or without a guide (corporal) in charge, march by the shortest route to the pile of stretchers, where each bearer in turn lays hold of the handle at the head end of the stretcher, raises it to a perpendicular position in front of him with the left hand, runners (rollers or U-bracket) to the front, stoops, grasping the lower runners with his right hand, places the stretcher on his right shoulder at the slope, and rising to the erect position, leads on, stepping short or marking time, until the others are ready. As soon as the last bearer has provided himself with a stretcher, he, or the guide in charge, gives the command "About Turn." The whole turn about and rejoin their squads in quick time, halting at the command "Halt" from the guide (or without further word of command if no guide is present) as they arrive in their places, when the instructor or section commander gives the command "Left (or Right) Turn," and the No. 3 bearers turn in the direction named. The lower handles of the stretcher are then placed on the ground, and the stretcher is held perpendicularly.

When the stretchers are at some distance from the squads, stand the bearers at ease, then call Nos. 3 (and Nos. 4 if haversacks have to be fetched) to attention, and send them for the stretcher; the remainder of the squad standing at ease until the stretchers (and haversacks) are brought to the squad. The bearers standing at ease must, of course, be called to attention before proceeding with the drill.

"Lower Stretchers."—The No. 3 bearers place the stretchers on the ground to the right of the squads, by passing the lower handles (foot of stretcher) forward, runners to the right, front ends of the poles (foot of stretcher) in line with the toes of Nos. 1, and rise together, working by the right.



Fig. 10.—Bearer section with closed stretchers.

"Stand to Stretchers."—On the word "Stretchers" the Nos. 1 place themselves with their toes in line with the front end of the pole, Nos. 3 with their heels in line with the rear end of the pole, allowing sufficient room for turning. Nos. 2 take position at centre of poles, Nos. 1, 2, and 3 bearers thus standing on the left of the stretcher. Each No. 4 bearer will take up position one pace in rear of and covering the bearer (No. 3) in front of him (Fig. 10).

SUPPLYING HAVERSACKS AND KNEE-CAPS

When supplying surgical haversacks from the heap where the stretchers lie on the parade ground, the No. 4 bearers are similarly told off, as are the No. 3 bearers when the command "Supply Stretchers" is given, and the words of command are the same. Instead of proceeding separately, the Nos. 3 and Nos. 4 should proceed together to the heap and fetch stretchers and haversacks respectively. The word of command is thus: "Nos. 3 and 4 Bearers—Right (or Left) Turn—Supply Stretchers and Haversacks—Quick March."

The No. 4 bearers slip the haversacks on their backs, strap over the left shoulder, as soon as they pick them off the heap on the parade ground.

Knee-caps.—When knee-caps are to be used, they are laid in a heap with the stretchers. Nos. 4 pick up and distribute the knee-caps to all four bearers as soon the stretchers are lowered. Knee-caps are fastened below the left knee, buckle on the outside.

LIFTING AND LOWERING STRETCHERS

“Lift Stretchers.”—On the word “Stretchers” Nos. 1 and Nos. 3 stoop, grasp both handles of the poles firmly with the right hand, and rise together, holding the stretcher at the full extent of the arm, runners to the right.

“Lower Stretchers.”—On the word “Stretchers” Nos. 1 and Nos. 3 stoop and place the stretcher quietly on the ground, runners to the right, and rise smartly to position, taking time from the right.

These movements should be repeated until they are smartly done and the squads are seen to act together.

DISMISSING (FROM STRETCHERS)

1. ON THE MARCH

“Halt—Lower Stretchers—About Turn—Quick March.”—The bearers halt, quickly lower stretchers, turn about and march until the last man, in this case No. 1, is two, three, or more paces clear of the stretcher.

“Halt—About Turn—Dismiss.”—When well clear of the stretchers the squad are called to the “Halt,” the bearers, after turning about, form into two ranks and are then dismissed (p. 9) in the usual way. Instead of turning the squads about, the bearers may be marched forward clear of the stretchers, halted and dismissed.

If Kneecaps are Worn.—The squad, after moving free of stretchers, are halted, knee-caps removed and collected, and the squad dismissed.

2. WHILST AT THE HALT

The proceeding is the same, only the initial command “Halt” is omitted.

TO STORE OR PILE STRETCHERS

“Lift Stretchers—Nos. 1 and 3 in Succession from the Right (or Left)—Disengage—Quick March.”—On

the word "March" the Nos. 1 and 3 on the flank named disengage by taking a side pace to the right so as to avoid No. 2, and move off in quick time, followed by the remaining Nos. 1 and 3 in succession, dispose of their stretcher, and rejoin their squads.

"Squads—Stand Easy."

"Remove Knee-caps."—Knee-caps are removed and collected (if necessary).

"Squads—Attention—Dismiss."

EXERCISES WITH CLOSED STRETCHERS

"Lift Stretchers."—As before detailed.

"By the Right (or Left)—Quick March."—The squads advance, taking steps of 30 inches.

"Squads—About Turn."—The whole turn about, the stretchers being passed from one hand to the other by the Nos. 1 and Nos. 3. When marching with closed stretchers, bearers turn towards the stretcher.

"Change Stretchers."—If the squads are advancing, the Nos. 1 pass the stretchers from one hand to the other behind them; Nos. 3, on seeing this done, pass the handles from one hand to the other in front of them; Nos. 2 moving diagonally to their places. If the squads are retiring, Nos. 1 act as for Nos. 3, and the Nos. 3 as for Nos. 1. The remaining bearers in each case continue in their respective positions.

Note.—The stretcher must be held in the right hand when the command "About Turn" is given; the runner will be to the left when the stretcher is in the left hand.

MOVING TO A FLANK

"Right Turn."—When it is necessary to make a quick movement to either flank for a short distance only, the command "Right (or Left) Turn" is given.

If the command "Right Turn" is given, the whole turn towards the stretchers, Nos. 1 and 3 bearers holding the stretcher in the right hand in front of them. But if the command "Left Turn" is given, the whole turn away from the stretcher, Nos. 1 and 3 holding the stretcher in the right hand behind, back of hand to rear.

When a squad are marching to the right and the command "About Turn" is given, the Nos. 1 and 3 seize the handles of the stretcher with the left hand and take away the right while turning about, resuming the grasp with the right hand, back of the hand to the rear, after the turn has been completed. The stretcher is now carried behind the bearers. Afterwards the squads are brought to the original direction, on the command "Left (or Right) Turn."

CHANGING DIRECTION

"At the Halt—Right (or Left) Form."—On the word "Form" the No. 1 of the squad on the flank named makes a full turn to the right (or left), the remainder of Nos. 1 a partial turn to the right (or left), the other bearers a partial turn (i.e. a half left (or right) turn) in the opposite direction.

"Quick March."—On the word "March" the No. 1 of the squad on the flank named stands fast, the remainder step off by the shortest route to their places on the new alignment, halt, and take up their dressing independently.

Note.—When it is intended to move off in the new direction after forming, the words "At the Halt" are omitted, the bearers mark time when formed, and the word "Forward" is given.

EXTENDING AND CLOSING (Fig. 11)

"From the Right (or Left or any named Squad) to Four Paces Extend."—On the march. On the word "Extend" the named squad continues to move on in quick time, the remainder make a partial (half) turn outwards, double to their places, and, turning to their front, break into quick time as they arrive there, taking up their dressing by the directing flank (or squad). On the commencement of the movement, the No. 4 bearers place themselves on the right of the stretcher opposite No. 1.

On the Right (Left, Centre, or any named Squad) Close.—On the word "Close" the named squad continue to move on in quick time, the remainder make a partial (half) turn in the direction named, double to

their places, and, turning to their front, break into quick time as they arrive there; the bearers on the right

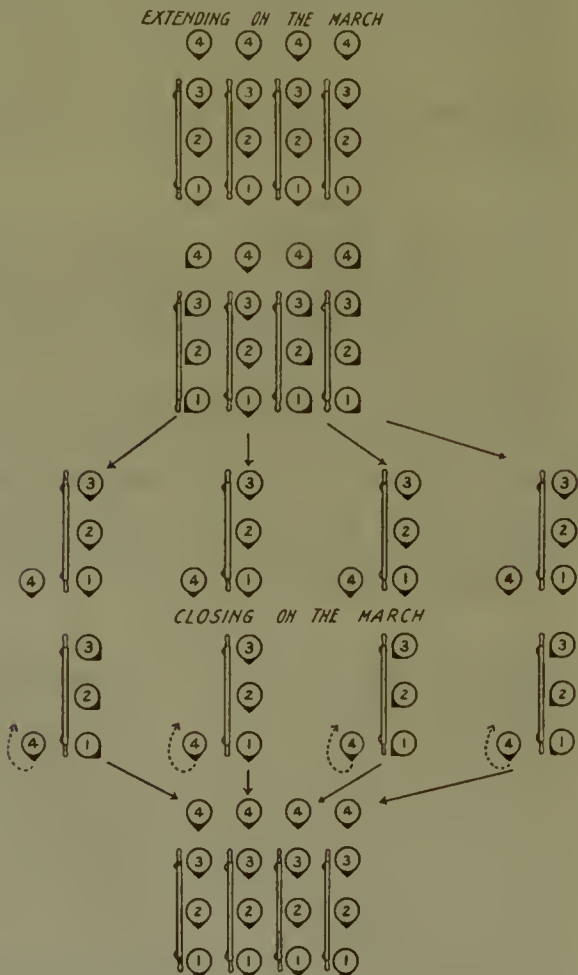


Fig. 11.—Extending and closing on the march from No. 2 squad.

(No. 4) of the stretchers drop back into their original places behind No. 3 bearers.

Extending from the Halt.—*See Note, p. 40.*

EXERCISES WITH PREPARED STRETCHERS

The preparing of stretchers, and all movements with prepared stretchers, are performed in extended order.

I. PREPARING AND CLOSING STRETCHERS

“Prepare Stretchers.”—The No. 4 bearers on the right of the stretchers take a side pace of 30 (or two side paces of 15) inches to the right, Nos. 1 and 3 then turn to the right, kneel on the left knee, unbuckle the transverse straps and drop the slings on the ground, separate the poles and straighten the traverses; each now takes up a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends over the opposite handle, grip-plate (buckle) uppermost.

Taking time from the right, they rise and turn to the left together.

“Close Stretchers.”—Nos. 1 and 3 turn to the right, kneel on the left knee, remove the slings and place them on the ground beside them, push in the traverses, raise the canvas, and bring the poles together.

Taking time from the right, they rise, lifting the stretcher, and face one another; place the handles of poles between their thighs, runners to the right, i.e. left of No. 1 and right of No. 3, and roll the canvas tightly over the poles to the right of the stretcher.

Taking time from the right, Nos. 1 and 3 take up a sling, and pass the grip-plate (buckle) end to each other; each holds in the left hand the grip-plate end given him, threads the transverse strap through the loop of the other sling and buckles tightly close to the runner, keeping the slings on top; then, grasping both handles in their right hands, back of the hands to the right, they turn to the right in a slightly stooping position, rise, and turn to the left together. The bearers on the right (Nos. 4) of the stretchers now take a

side pace of 30 inches (or two side paces of 15 inches) to the left. This brings No. 4 close to the stretcher.

2. LIFTING AND LOWERING PREPARED STRETCHERS

"Lift Stretchers."—On the word "Stretchers," Nos. 1 and 3 stoop, grasp the doubled sling midway between the poles with the right hand, and sweep it off the handles, rise, holding it at the full extent of the arm, grip-plate to the front.

Taking time from the right, Nos. 1 and 3 take a side pace between the handles and place the sling over the shoulders, with ends in front dividing it equally, grip-plate to the right, taking care that the slings are well below the collar of the coat behind and in the hollow of the shoulders in front.

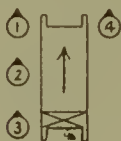


Fig. 12. — Position of bearers with stretcher prepared.

Taking time from the right, Nos. 1 and 3 stoop, slip the loops over the handles, commencing with the left, grasp both handles firmly beyond the loops of the sling, and rise slowly together, lifting the stretcher, No. 3 conforming closely to the movements of No. 1. Care must be taken that the patient's feet are not raised above

the level of the head.

"Adjust Slings."—On the word "Slings," Nos. 2 turn about away from stretcher, step forward one pace, and adjust slings on Nos. 3; Nos. 4 turn to the left, and adjust the slings on Nos. 1, taking care that they are well below the collar of the coat behind, and in the hollows of the shoulders in front. The Nos. 1 and 3 bearers should slightly raise the stretcher so that the slings are slackened a little to allow of Nos. 2 and 4 manipulating the slings to get them comfortable. The length of sling may be adjusted by means of the grip-plate, if necessary.

Taking time from the right, Nos. 2 turn about and step forward one pace, Nos. 4 turn to the right into place (Fig. 12).

"Lower Stretchers."—On the word "Stretchers," Nos. 1 and 3 slowly stoop and place the stretchers gently

on the ground—Nos. 3 conforming closely to the movements of Nos. 1—slip the loops from the handles, and stand up.

Taking time from the right, Nos. 1 and 3 remove the slings from the shoulders, hold them as before described, take a side pace to the left, and stand to stretcher.

Taking time from the right, Nos. 1 and 3 stoop, place the slings on the handles, as in prepared stretchers, and rise together.

3. CHANGING NUMBERS

“Change Numbers.”—On the command “Change Numbers,” No. 4 turns about and moves round the head of the stretcher to take the place of No. 3. Nos. 1, 2, 3 advance, No. 1 moving by foot of stretcher to place vacated by No. 4, and Nos. 2 and 3 move up a pace. Each man halts in the position of the bearer whose place he has taken. By this mode No. 4 becomes No. 3, No. 2 becomes No. 1, No. 3 becomes No. 2, and No. 1 becomes No. 4 (Fig. 13). Until the bearers thoroughly understand their work, it is well to prove the bearers before proceeding further.

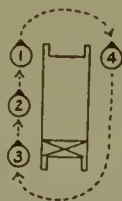


Fig. 13.—Changing numbers.

4. MOVEMENTS—ADVANCING AND RETIRING

When squads are ordered to advance, the directing squad or flank is named—that is “By the Right, Left, Centre” or any named squad or section.

“Advance.”—The whole move off together, stepping short; No. 3 steps off with the right foot, the remainder with the left, while Nos. 1 and 3 keep their knees bent and raise their feet as little as possible. Special attention must be paid to the carriage of the stretcher, to keep it level and to avoid jolting or unnecessary swaying.

“Retire.”—Each squad moves round by the right on the circumference of a circle of which No. 3 is the centre, No. 3 marks time, turns gradually in the direction named, and the whole move forward when square.

“Advance.”—Each squad resumes the original direc-

tion to the front by a movement similar to that detailed for retiring.

“Right (or Left) Incline.”—No. 3 marks time, and the whole turn gradually in the direction named, moving forward diagonally in the new direction (Fig. 14).

Note.—If “Incline” is repeated, the squads will be in “Column of Squads” (one squad behind the other as in single file), with an interval of one pace between each squad.

To form into line, the command “On the Right (or Left)—Form Line” is given. The bearers of the leading squad mark time, the remainder make a partial turn in the direction named, and each squad moves forward until in line with the leading squad, when the word “Forward” is given.

“Section Halt.”—The whole halt; care being taken not to jar or jolt the stretcher.

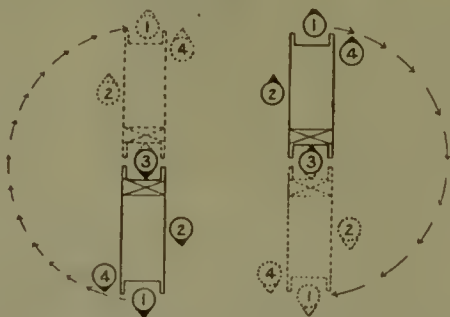


Fig. 14.—Wheeling with prepared stretchers.

5. LOADING AND UNLOADING STRETCHERS (Fig. 15)

Men provided with ground sheets, to act as patients, are placed in front of the squads extended to four paces, and are directed to lie down with their heads towards the squads.

Note.—When the squads are sufficiently advanced in these exercises, the Nos. 4 will take charge of their respective squads.

Loading

“Collect Wounded.”—Each squad doubles with closed stretcher by the shortest route to the corresponding patient, and halts without further word of command when one pace from the head of and in line with the patient. No. 4 proceeds to the patient, examines him and attends to his injuries, and if his conveyance by stretcher is necessary, No. 4 gives the following words of command, viz., “Lower stretcher—Prepare stretcher.”

Note.—The command “Collect Wounded” may be given when the squads are standing easy, in which case they will come to attention, lift stretchers, and double out as above described.

Whilst the stretcher is being prepared by Nos. 1 and 3, the disengaged bearers proceed

Fig. 15.—(A) Closed stretcher arrived ; (B) No. 4 advanced to patient ; (C) No. 4 examines patient ; (D) Nos. 1 and 3 turn towards and prepare stretcher ; (E) Nos. 2 and 4 attend patient ; (F) No. 4 helps 1, 2 and 3 to raise patient on their knees ; (G) No. 4 fetches stretcher ; (H) patient lowered on stretcher ; (I) marching with loaded stretcher ; (J) unloading stretcher ; (K) and (L) No. 4 removing stretcher whilst 1, 2, and 3 support patient on their knees ; (M) stretcher closed and removed.



to the patient to render such assistance as may be required, the No. 2 going to the left, the No. 4 to the right. No. 4 may call upon Nos. 1 and 3 bearers also to assist in rendering first aid if there are several wounds requiring immediate attention.

"Load Stretcher."—When the patient is ready for removal on the stretcher, No. 4 gives the command "Load Stretcher," when the bearers place themselves

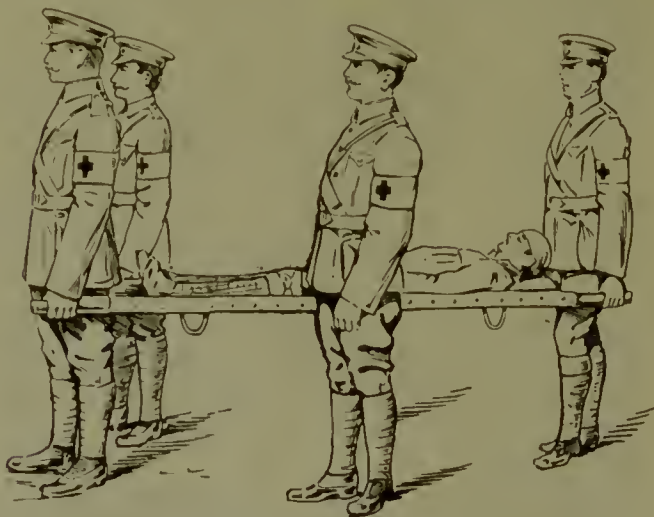


Fig. 16.—Position of bearers carrying loaded stretcher.

as follows: Nos. 1, 2, and 3 on the left of the patient, No. 4 on the right, No. 1 at the knees, No. 2 at the hips, No. 3 at the shoulders, No. 4 on the patient's right opposite No. 2.

The whole turn towards the patient and kneel on the left knee, pass their hands beneath the patient; No. 1 supports the legs, No. 2 the thighs and hips, No. 3 the upper part of the trunk, No. 4 on the right assisting to lift the patient by passing his hands beneath in corresponding position to No. 2. In lifting the patient off the

ground, special care must be taken of the injured part, No. 4 giving the necessary instructions for carrying out this precaution.

In the case of severe injury, No. 4 attends to the injured part in lifting.

"Lift."—The No. 4 now gives the command "Lift," when the patient is carefully lifted on to the knees of Nos. 1, 2, and 3. No. 4 on the right of the patient disengages, rises, and steps back one pace; turns to his left, doubles to the stretcher, takes hold of it, left hand across, rises, the near pole resting on the left hip, returns to the patient and places it directly beneath him, then stands up. No. 4 now kneels on his left knee and assists in lowering the patient.

"Lower."—The No. 4 giving the command "Lower," the patient is lowered slowly and gently on to the centre of the canvas, special care being taken of the injured part.

When the patient is laid on the stretcher, the bearers disengage, rise, Nos. 1, 2 and 3 turn to the left, No. 4 to the right, and the whole stand to stretcher as in prepared stretchers.

"Lift Stretchers."—See p. 28 and Fig. 16.

Collecting Equipment.—The Nos. 2 and 4 collect the arms and equipment of the patient. The rifle should be examined by pointing it in the air, opening the breech, and detaching the magazine to ensure that it is unloaded.

Note.—Men under instruction should be exercised in carrying the loaded stretcher over various obstacles, and taught the methods most suitable for the safe carriage of the patients. When squads are acting independently they should be instructed to move at as wide an interval as possible, with a view to minimising the target for the enemy's fire, the disengaged bearers taking care not to become detached from the squad.

Unloading

"Unload Stretchers."—The bearers place themselves as described for loading, Nos. 1, 2, 3, on the left, and No. 4 on the right opposite No. 2.

If on the march, No. 4 gives the command, "Halt—Lower stretcher—Unload stretcher."

"Lift."—The patient is lifted, as described for loading, on to the knees of Nos. 1, 2 and 3, assisted by No. 4, then No. 4 on the right of the patient disengages, rises, steps back one pace, grasps the stretcher as described for loading, and, lifting it clear of the patient, carries it forward three paces clear of the patient's feet.

He then rejoins his squad, and with the other bearers assists in lowering the patient to the ground.

"Lower."—On the word "Lower," the patient is gently lowered to the ground, the bearers disengage, rise, and turn towards the stretcher, the whole stepping off to their places at the stretcher as in prepared stretchers. On completion of this exercise the stretchers are closed and the squads join their section.

CHAPTER IV

STRETCHER EXERCISES WITH SIX BEARERS, ARRANGED FOR WOMEN

As mentioned previously, it is unwise to allow women to handle or carry loaded or unloaded stretchers with fewer than six bearers to a stretcher. The following has been modified in some points from the R.A.M.C. regulation drill, with six bearers to a stretcher, so as to suit women. All the details are not repeated, but only those where there is a departure from the drill laid down in this manual for four bearers.

FORMATION FROM SINGLE RANK INTO TWO RANKS

The detachment is drawn up in single rank, sized, and formed into two ranks by the following words of command:—

“Even Numbers—Two Paces Step Back—March.”

—The even numbers, Nos. 2, 4, 6, 8, etc., take two paces of 30 inches backwards, commencing with the left foot.

“On the Right Close.”—No. 1 front rank stands fast; all others take short paces to the right until adjacent to their right-hand bearer. The rear rank bearers cover off (that is, stand behind) the bearers of the front rank to their immediate front.

“Right Dress.”

“Number.”—The front rank alone number off; the rear rank take the number of the front rank bearers immediately in front of them.

“Stand at Ease.”

TO FORM SQUADS OF SIX BEARERS

“Attention.”

“By Sixes Number.”—The front rank, commencing on the right, number from right to left in order—1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6, 1, 2, etc., and so on, Nos.

1, 7, 13, 19, of the front and rear ranks of the original alignment becoming Nos. 1 of the squads.

"Squads at the Halt—Left Form—Quick March—Right Turn."—No. 6 of each squad in the front rank turns to the left, the remaining bearers of the front rank make a partial turn to the left; the rear rank remain steady. At the word "March" the whole except the Nos. 6 step off to their places in the new

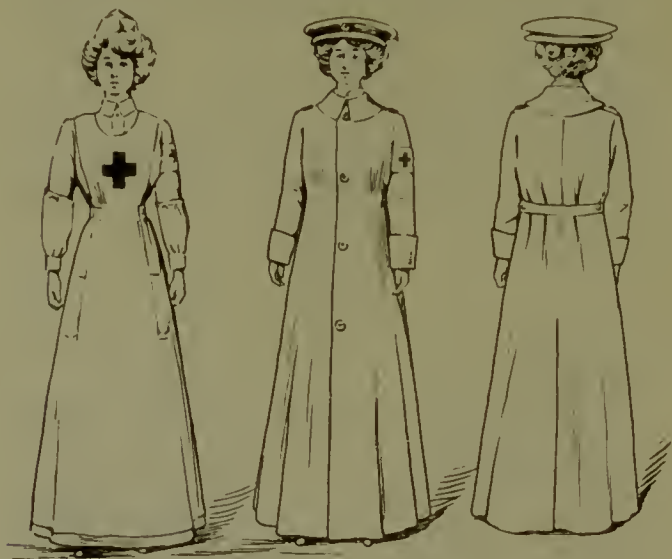


Fig. 17.—Indoor and outdoor uniform.

alignment. At the word "Turn" all turn to the right. The bearers are now in sixes (stretcher squads) (see p. 19 and Fig. 8 for corresponding movement).

"Right Dress."—No. 1 of squad on the right remains steady, the remaining No. 1 bearers each take up position one pace from and in line with the bearer to their immediate right; the remaining bearers (Nos. 2, 3, 4, 5, 6) place themselves one pace in rear of and covering the bearer in the immediate front; that is, No. 2 covers No. 1; No. 3 covers No. 2; No. 4 covers

No. 3; No. 5 covers No. 4; No. 6 covers No. 5, in each squad. If necessary the bearers in the squads may be proved, as follows:—

PROVING BEARERS AND SQUADS

“Front Rank—No. 1 Bearers—Stand at Ease.”

“Second Rank—No. 2 Bearers—Stand at Ease.”

“Third Rank—No. 3 Bearers—Stand at Ease.”

“Fourth Rank—No. 4 Bearers—Stand at Ease.”

“Fifth Rank—No. 5 Bearers—Stand at Ease.”

“Sixth Rank—No. 6 Bearers—Stand at Ease.”

“**The whole - Attention.**”—All come to attention together.

“**Number the Squads.**”—No. 1 bearers number from right to left.

“**Number the Sections.**”—A section commander is placed in charge of four squads, which represents one section; when two or more sections are on parade, the section commanders will number from right to left: No. 1. section; No. 2 section; and so on.

“**Stand at Ease.**” “**Stand Easy.**”

EXERCISING WITH CLOSED STRETCHERS

SUPPLYING STRETCHERS

The stretchers are laid in a heap on the ground adjacent to the detachment.

The squads are drawn up in sixes in close order at one pace interval.

“**Supply Stretchers.**”—On the word “Stretchers,” the Nos. 1 and 3 bearers take a side pace to the right.

Note.—If haversaeks are being used, Nos. 4 move with Nos. 1 and 3 (*see* p. 22).

“**Quick March.**”—On the word “March,” the Nos. 1 and 3 bearers in succession from the right (or left) lead to the pile of stretchers, the No. 1 going to the foot of the stretcher and No. 3 to the head; they stoop, and grasp the handles with the right hands, rise, lifting the stretcher, and march forward until clear of the pile, then, when all are ready, wheel towards the detachment, pass round the rear rank and on the right

of their own stretcher squad halt, and take a side pace to the left as soon as they arrive in their places.

LIFTING AND LOWERING STRETCHERS

The squads practise lifting and lowering stretchers according to the directions given at p. 23. The words of command are—

“Lift Stretchers.”

“Lower Stretchers—Stand at Ease.”

MARCHING WITH CLOSED STRETCHERS

The squads being drawn up as a section in squads of six to a stretcher in close order, the instructor gives the words of command according to the directions at p. 24. The words of command are—

“Squads—Attention.”

“Lift Stretchers.”

“By the Right (Left or any Squad)—Quick March.”

Having advanced a certain distance the command is—

“Squads—About Turn.” —Nos. 6 now lead.

Squads may be practised in this movement for some time.

MOVING TO A FLANK (*see* p. 24)

MOVEMENTS WITH CLOSED STRETCHERS (Fig. 18)

Extending. **“From the Right (or Left or any named Squad) to Four Paces—Extend.”** *On the march.* On the word “Extend” the named squad (No. 2 in Fig. 18) continues to move on in quick time; the remainder make a partial turn outwards (away from directing squad), double to places, and turn to their front, breaking into quick time as they arrive there, and taking up their dressing by the directing squad. On the commencement of the movement Nos. 4, 5, and 6 bearers place themselves on the right of the stretcher.

Closing. **“On the Right (Left or any Named Squad) (No. 2 in Fig. 18)—Close.”** The named squad continues to move on in quick time, the remainder make a partial turn in direction named, double to their places, and turn to their front, breaking into quick time as

EXTENDING ON THE MARCH

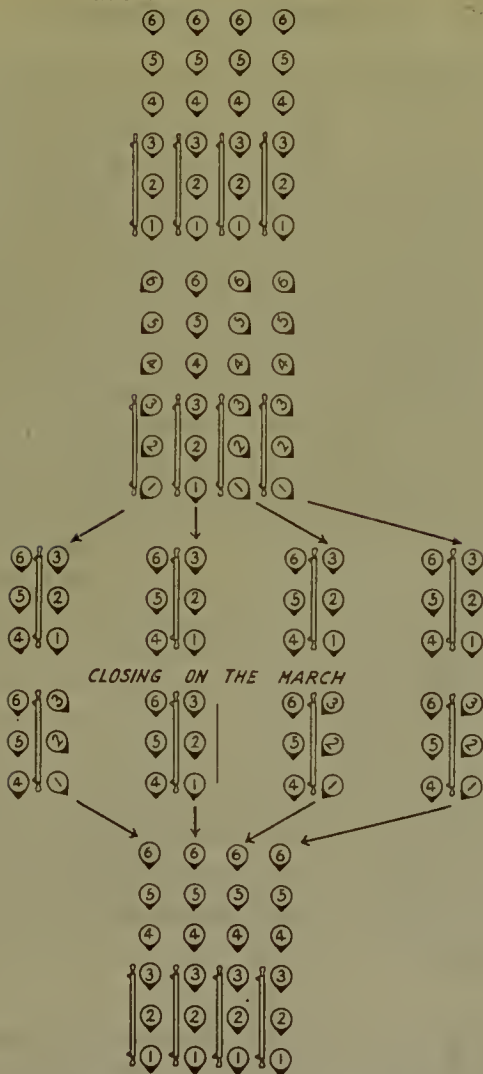


Fig. 18.—Extending and closing on the march from No. 2 squad (six bearers to a stretcher).

they arrive there. The bearers on the right (4, 5, and 6) of the stretcher drop back in their original places.

Note.—In drill halls where there is not sufficient room to practise extending movements on the march, this may be done from the halt. On the command “No. (—) Squad Stand Fast—from No. (—) Squad—Extend,” the remaining squads turn outwards, that is, away from the named squad. Suppose it is the right squad (or No. 1) that is named, the remaining squads turn to the left, and step off in quick time. As soon as No. 2 squad has gone four paces, No. 1 of No. 2 squad taps the No. 1 of No. 3 squad on the back; the bearers of No. 2 squad, on the tap being given, immediately halt, and turn to the front together. The squads continue the march, No. 3 squad tapping No. 4 squad on completion of our paces, and so on to the other end of the line.

While this movement is being carried out, Nos. 4, 5, and 6 place themselves on the right of the stretcher.

EXERCISING WITH PREPARED STRETCHERS

The movements for six bearers when stretchers are being prepared is exactly the same as for four bearers (*see* p. 27), except that Nos. 4, 5 and 6 are on the right of stretcher in place of No. 4 only.

CHANGING NUMBERS WITH SIX BEARERS

“**Change Numbers.**”—The bearers on the right of the stretcher (Nos. 4, 5, and 6) turn about. The whole step off together, No. 1 wheeling round by the foot of the stretcher and taking up the position of No. 4, No. 6 wheeling round the head of the stretcher and taking the place of No. 3, the other bearers taking the place of the bearers in front of them. The bearers now on the right of the stretcher turn about.

COLLECTING WOUNDED

On the word of command “**Collect Wounded—Advance,**” the stretcher squad move by the shortest route to the patient and halt one pace from the head of and in line with him; No. 4 then proceeds

to the patient and examines his injury, and if carriage by stretcher is necessary, gives the commands—

“Lower Stretcher.”

“Prepare Stretcher.”

Whilst the stretcher is being prepared by Nos. 1 and 3, the disengaged bearers 2, 5 and 6 advance and render such assistance to the patient as may be required, under the direction of No. 4. The necessary assistance having been rendered, No. 4 gives the command—

“Load Stretcher.”—The bearers place themselves as follows: Nos. 1, 2 and 3 on the left, Nos. 4, 5 and 6 on the right of the patient; Nos. 1 and 4 at the knees, Nos. 2 and 5 at the hips, Nos. 3 and 6 at the shoulders, all kneeling on the left knee. Nos. 1 and 4 pass their hands beneath the patient's knees, Nos. 2 and 5 beneath the hips, and Nos. 3 and 6 beneath the shoulders, care being taken of the injured part, one of the bearers being especially detailed by No. 4 for this purpose.

“Lift Wounded.”—No. 4 gives the command “Lift,” when all carefully lift the patient on to the knees of Nos. 1, 2 and 3. Nos. 4, 5 and 6 disengage and stand up. No. 5 steps back two paces, Nos. 4 and 6 turn to the left and double to the stretcher, take hold of it by the handles (No. 4 at the foot and No. 6 at the head), carry it forward and place it on the ground beneath the patient close up to the feet of Nos. 1, 2 and 3. Nos. 4, 5 and 6 then close in upon the stretcher, kneel down, and assist in supporting the patient.

“Lower Wounded.”—No. 4 giving the command “Lower,” the patient is lowered slowly and gently on to the centre of the canvas, special care being taken of the injured part. The bearers disengage, stand up, Nos. 1, 2 and 3 turn to the left, Nos. 4, 5 and 6 turn to the right.

“Lift Stretcher.”—On No. 4 giving this command, Nos. 1 and 3 bearers stoop, slip the loops off the handles and stand up, take a side pace to the right between the poles, and place the sling over the shoulders, grip-plate to the right. At the same time

No. 5 bearer moves round the head of the stretcher and takes up a position behind No. 2.



Fig. 19. Hook of a stout piece of wire (a meat skewer answers well) bent to hook into side of stretcher whereby Nos. 2, 4, 5 and 6 may assist to carry.

Nos. 2 and 5 and 4 and 6 turn towards the stretcher, stoop, take hold of the poles, the hands wide apart and palms uppermost, and rise, lifting the stretcher and holding it at the full extent of the arms. Nos. 1 and 3 then slip the loops of the sling over the handles of the stretcher, and grasp the handles firmly outside the loops. If the slings require adjusting, No. 4 adjusts the sling over the shoulders of No. 1, and No. 5 over the shoulders of No. 3, but if Nos. 1 and 3 place the slings over the shoulders properly this will not be necessary. Nos. 2 and 5 support the stretcher with the right hand,

Nos. 4 and 6 with the left hand.

By this method all the six bearers take part in carrying the stretcher, which is usually done by Nos. 1 and 3 only.

Note A.—It will be observed that in this drill Nos. 1 and 3 are not required to stoop, thereby avoiding strain in lifting. Nos. 2, 4, 5 and 6 raise the stretcher high enough to enable Nos. 1 and 3 to slip the loops of the slings over the handles.

Note B.—In improvised stretchers short loops of rope or leather straps (luggage straps with handle) can be fixed to the sides of the poles to enable Nos. 2, 4, 5 and 6 to assist Nos. 1 and 3 to carry stretcher.

CHAPTER V

IMPROVISED STRETCHERS

ANY apparatus by which a patient can be carried in a horizontal position constitutes an improvised stretcher. The materials of which stretchers of the kind can be made are many, and there is ample scope for the ingenuity of the bearers in improvising them.

It is necessary to examine the strength of the materials before the stretcher is put together, and after it is prepared it should be tested before the patient is placed upon it. To test a stretcher, place a "sound" man on the stretcher; the bearers then lift it by the handles, and, shaking it up and down rather sharply, notice if it bears the strain.

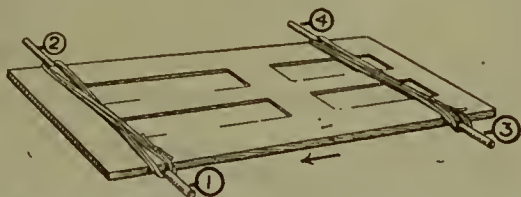


Fig. 20.—Door prepared as a stretcher for four bearers.

Hurdles, doors (Fig. 20), ironing boards, and wooden or iron palings, etc., may all be utilised as stretchers. When available, blankets, mattresses, cushions, horse cloths, etc., may be placed on the stretcher to make it more comfortable to lie on.

Rifle Stretcher.—Owing to the reduction in length of the modern rifle, this weapon cannot now be used for a stretcher. Sporting guns, being usually under 4 feet in length, are also too short to be utilised as stretcher poles. A rifle, even with a bayonet fixed, is too short for the purpose.

Coat Stretcher.—With two poles $6\frac{1}{2}$ to 7 feet long

with cross-bars lashed at either end, and two or three coats, a stretcher can be improvised. The coats, which may be the soldier's tunic, or two jackets for everyday wear, are prepared thus: Hold up the coat by the collar; pass the hand down the sleeve from the armhole on the inner side of the coat as far as the cuff, seize the cuff and pull, turning the sleeve inside out; do this for both sleeves. Button the coat in the ordinary way, as when it is being worn, and lay the coat on the ground. Two or three coats, according to the dimensions of the coats and the height of the patient to be carried, are similarly treated, and the coats are then laid in a row (end on) on the ground. The inverted sleeves are, of course, inside the buttoned coats. The buttoned sides of the coat should be laid



Fig. 21.—Stretcher formed of two coats and a waistcoat.

next the ground, the back of the coat being uppermost. Now pass the poles through the sleeves, first on one side, then on the other, fix the traverses, and two men can carry the stretcher. If no traverses can be improvised, four men can carry the stretcher, one at each pole-handle. It is necessary to see that the coat material is strong enough, and that the buttons are secure.

Hospital Operating - Theatre Stretcher. — To remove a patient from bed to the operating table and back a simple form of stretcher is used. Beneath the patient as he lies in bed a piece of canvas 5 feet 8 inches long and 24 inches wide is passed. At each side of the canvas there are "channels" along which the poles are passed. The poles are round, and 6 feet 6 inches in length. When they are in position, a transverse iron rod with a ring at each end is slipped over the

handles of the poles, one rod at each end of the stretcher.

Sack Stretcher.—Lay two ordinary corn sacks end to end, the bottom of the sacks touching; cut two slits in the bottom of each sack, one on either side, of sufficient size to allow the poles to pass. Slip the poles along the sides of the sacks, and by a cross-bar of wood or metal at each end the stretcher breadth can be maintained.

Blanket Stretcher. 1. *For Two Bearers.*—Spread out a blanket, a piece of canvas, a couple of sheets, a tarpaulin, or a horse cloth. Lay two poles within two inches of the edges of the blanket and fold the blanket round the poles; roll up in this way until a bed of 20 to 22 inches breadth is left between them. If only two bearers are available the infolded blanket must be stitched by a packing or improvised needle to the blanket bed, and the breadth maintained by an improvised cross-bar at each end. If no means of stitching by a needle is to hand, holes may be made in the blanket bed, and through them twine may be passed and run along, embracing the poles enclosed in the blanket edge. (See the Red Cross First Aid Manual, No. 1.)

2. *For Four Bearers.*—If the blanket cannot be thus stitched, four bearers will be required, and the patient can be carried only a short distance, say not more than 100 yards. The four bearers will be stationed on either side, two at each end, facing inwards; each bearer grasps the pole, as it is rolled in the blanket edge, with the two hands, one hand close to the end of the blanket, and the other $2\frac{1}{2}$ feet along the pole. As the bearers must advance sideways, one foot crossing the other, the progression is slow and the distance possible to cover small. (See the First Aid Manual.)

Substitutes for Needles.—In many ways a needle and thread are required in ambulance work in the field. Clothes want mending, buttons have to be sewn on, stockings have to be darned, etc., etc., but it is when improvising stretchers of blankets, canvas, sacking, etc., that the want of a needle is most felt. There are several substitutes for stitching coarse materials together, which will be readily understood from the diagram.

No. 1 in the diagram (Fig. 22) shows a packing needle threaded. No. 2, a hairpin threaded; the points are held between the finger and thumb whilst being passed through canvas, blanket, etc. No. 3, wire from neck of mineral-water bottle twisted to a point, and with a loop for thread or twine. Nos. 4 and 5, pencils with rings or eyes (as sold in shops) threaded and used as needles. No. 6, a piece of wood pointed and notched for thread (both edges of notch for thread are to be rounded off). No. 7, a shuttle-shaped piece of

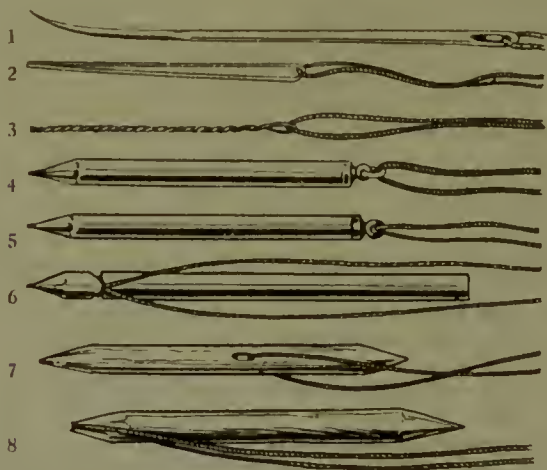


Fig. 22.—Substitutes for needles (*see text*).

wood, with a hole bored or burnt through its centre, threaded. No. 8, a notch cut in point of "needle," across which a piece of twine may be passed whilst the "needle" is being pushed through the canvas.

The best substitute for a needle in ambulance work is the silver probe carried in the bearers' cases. The probe has an eye which can be threaded, and the point of the probe will readily pass through blanketing, canvas, etc.

Improvised Rope Stretcher for V.A.D. Use.—The R.A.M.C. stretchers and most regulation stretchers are

too wide to go through the doorway of a railway carriage, too wide to lie on the seat, and too long to be placed in a compartment, either on the floor or on the seat, and seeing the V.A.D. will have to use railways as a means of conveying their wounded, the improvised stretcher should be made of a length and width allowing this to be done.

Railway Passenger Carriages.—The dimensions are :

Width of seat	1 ft. 6 to 7 in.
Width of door outside	2 ft. 1 in.
Width of door in the clear	1 ft. 10 to 11½ in.
Width of carriage (length of seat)	7 ft. 4½ in. (no elbows)

Corridor compartments.—The width (length of seat) is 5 ft. 1½ in. (no elbows).

It is evident that corridor compartments do not allow of patients lying down, either with or without stretchers.

Sleeping carriages should be used whenever possible.

Although the military stretcher, which is 7 feet 9 inches in length, cannot be accommodated in any railway carriage, the V.A.D. improvised rope stretcher, the poles of which are 6 ft. 9 in., can be so used.

Instead of the regulation stretcher in use, the V.A.D. may practise with and use for field purposes a stretcher made up of the following parts :—

1. Round ash poles, 1½ inches in diameter, 6 feet 9 inches long, with the ends slightly bevelled.

2. Round ash cross-bars, 1½ inches in diameter, 1 foot 10 inches long.

3. A rope 38 feet long in one piece, or in two pieces each 19 feet long. Rope of window cord or fire-man's rope.

4. Four pieces of string, each 4 feet long

5. Four pegs (nails, spigots of wood, or pencils, etc.)

The poles and cross-bars may be notched so that they fit into each other. The notches in the poles are commenced 6 inches from the ends of the poles and cut 1½ inches wide and ½ inch deep. The notches in the cross-bars are commenced ½ inch from the ends of the cross-bars and made 1½ inches wide and ¼ inch deep (Fig. 27).

Where the pole and cross-bar notches meet, holes are made (bored or burnt) through both pole and bar at the centre of the notches, the bore being about $\frac{1}{4}$ inch in diameter—about the thickness of an ordinary

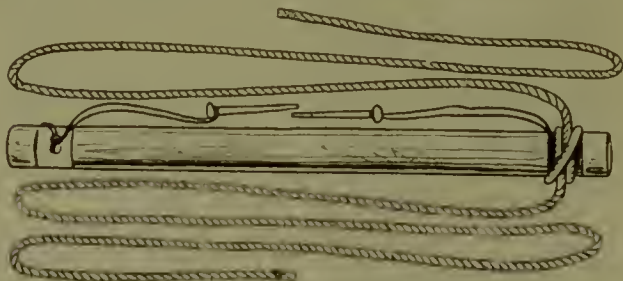


Fig. 23.—Improvised transverse bar, notches cut and holes bored through bottom of notches. Rope showing nails attached by twine.

lead pencil. A peg (nail, or spigot of wood, or pencil, etc.) is inserted through the hole, thus fixing the pole and cross-bar together; the string attached to the nail

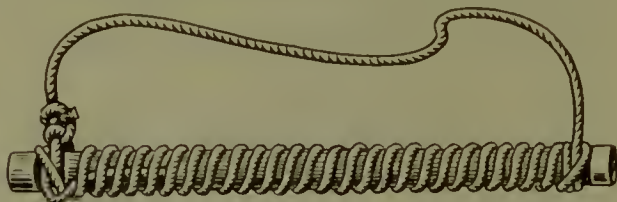


Fig. 24.—Improvised transverse bar, showing method of twisting rope round the bar and making loop.

(as in Fig. 23) is passed round the pole and bar where they cross, in a figure-of-eight fashion.

TO FASTEN ROPE ON CROSS (TRANSVERSE) BAR, AND TO FORM LOOP FOR SHOULDER.

To form the loop, measure off a piece of the rope equal to $2\frac{1}{2}$ lengths of cross-bar, make a clove hitch

over notch at one end of cross-bar (Fig. 23). Carry the short end to opposite notch, make a clove hitch, and lay the loose end along the bar. Roll the strand (long end) of the rope round the bar neatly, commencing at the end where the clove hitch was made,



Fig. 25.—Nos. 1 and 3 bearers equipped with stretcher poles and with transverse bars, with ropes adjusted, slung on back ready for improvised use.

and as the opposite notch is approached cover over the loose end of the rope forming the loop (Fig. 24) and tie off by fastening round the rope forming the loop in a double hitch close to the bar. The cross-bar can now be slung over the left shoulder (Fig. 25).

The poles and transverse bar, when no peg, nail, or spigot of wood is to hand, may be fastened by string alone; when neither peg nor string can be obtained,

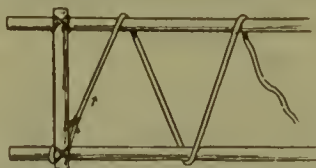


Fig. 26.—Unsatisfactory method of lashing rope for stretcher bed. Showing string and rope forming corner lashings.

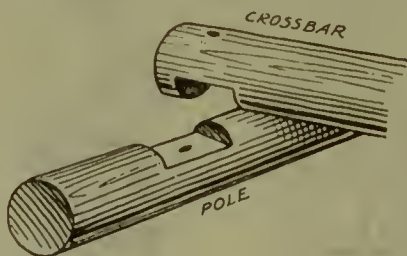


Fig. 27.—Notch in pole and transverse bar. Hole bored for nail or spigot of wood.

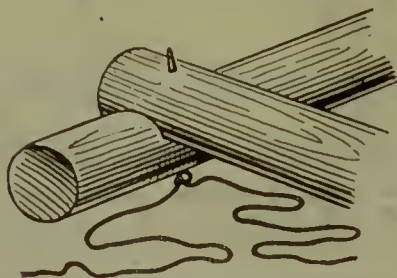


Fig. 28.—Nail in position, with string for lashing.

the rope which is to form the stretcher bed should be used to fasten the poles and bars at the corners (Figs. 26, 31, 32).

When the poles and transverse bars are lashed (Fig. 28), the rope may be applied to form the bed of the stretcher in various ways:—

(a) *Rope in one piece* (Fig. 31).—The rope, if in one



Fig. 29.—Transverse bar of wood with notches for poles.



Fig. 30.—Holes in transverse bars for passage of handles of poles.

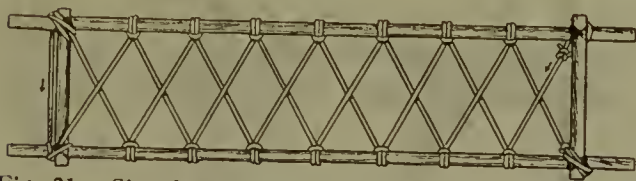


Fig. 31.—Showing rope in one piece for stretcher bed.
(See text.)

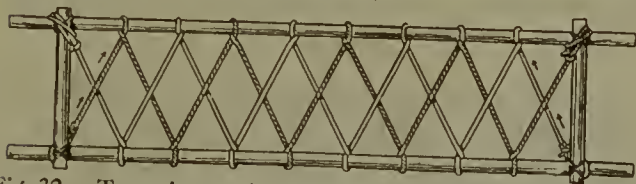


Fig. 32.—Two pieces of rope for stretcher bed, commenced and ending at opposite corners.

piece, has to be fixed at one end round the corner next the bearer where the pole and transverse bar cross.

The rope is now carried from side to side along the length of the stretcher in loops round the poles. When the far end of the stretcher is reached the rope is twisted round the corner farther off from the bearer, then carried across parallel with the cross-bar to the nearer corner (on the side next the bearer), twisted round the pole and cross-bar, and then along the poles



Fig. 33.—Different methods of fixing rope over poles, showing “simple turn,” “clove hitch,” and “double turn.”

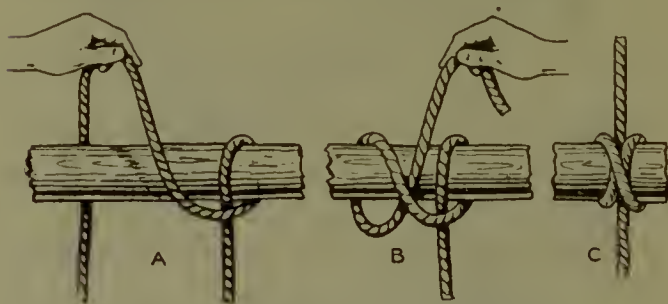


Fig. 34.—Details of how to form a clove hitch on poles.
A, commenced. B, completed. C, tightened.

passing between the previous turns, and tied off at the corner opposite to where it was commenced.

(b) When the rope is in two pieces of equal length (Fig. 32), a firmer bed is made, as each corner is strengthened by a rope where it starts and ends, and it is much more quickly applied, since two bearers can work at the same time.

If no fixings or lashings are available for pole and transverse bar crossings, the rope must be carried from

corner to corner before it is carried round poles, and again from corner to corner at opposite ends of the stretcher.

In the simple turn (Figs. 33, 34) the rope is passed over the upper side of the pole, then round the outside and beneath, and finally above the strand of rope which first approached the pole. A clove hitch knot or a double turn will give additional security against slipping, but is seldom necessary, and takes longer time to apply.

DRILL WITH IMPROVISED ROPE STRETCHER

The squads will be drawn up as for stretcher drill (p. 17) and proved. The poles and the transverse bars (with the ropes round them) are placed in a heap adjacent to the parade.

On the command, "**Nos. 1 and 3 Bearers, Right (or Left) Turn—Collect Poles and Transverse Bars—Quick March,**" Nos. 1 and 3 bearers march to the pile of poles and transverse bars, stoop, each taking hold of a transverse bar, place the loop over the head and on to the left shoulder, so that one end of the bar is at the back of the left shoulder, the other end towards the right hip. Each then takes hold of a pole and places it on the right shoulder at the slope, holding the pole with the right hand, and marches forward a short distance until the last bearer has been supplied, when the command will be given "**About Turn—Forward.**" The bearers will march back to their places, halt, and turn to the front.

On the command "**Lower Poles,**" Nos. 1 and 3 bearers stoop and place the poles on the ground to the right of the squad, and stand up.

"**Stand to Stretchers.**"—The bearers stand to the poles as in drill with service stretchers.

"**Lift Stretchers.**"—Nos. 1 and 3 stoop, and, grasping both poles with right hand, rise together.

On the word of command, "**From the Right (or any named Squad)—Extend,**" the squads extend four paces, as at pp. 25 and 40.

"**Lower Stretchers.**"

"**Prepare Stretchers.**"—On this command Nos. 2 and 4 bearers take post at ends of poles facing one an-

other; No. 2 at the foot and No. 4 at the head stoop, take hold of a pole in each hand and stand up holding the poles, notches uppermost. Nos. 1 and 3 take up their places, No. 1 moving round by the foot of the stretcher to the opposite side and remaining at the foot, No. 3 turning to the right and remaining at the head of the stretcher. Nos. 1 and 3 slip the loop of the transverse bars off their shoulders, undo the rope from off the bars, and place the bars in position over the ends of the poles. They then fasten the poles and transverse bars in position by pushing the nail (piece of wood, pencil, etc.) into the holes in the bar and pole, tying

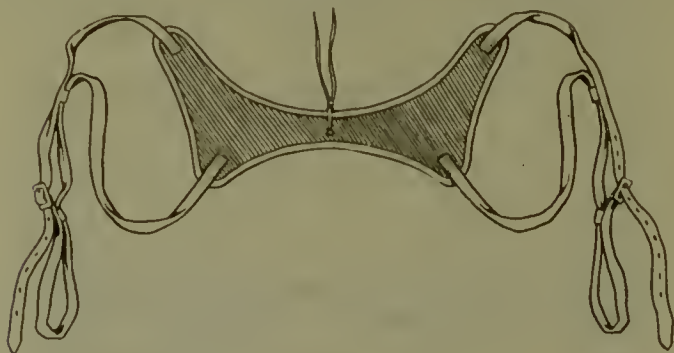


Fig. 35.—Sling to be worn under tunic of bearer.

them with the twine by which the nails are attached. Then Nos. 1 and 3 fix the ropes to the poles by fastening the end of the rope round the pole and transverse bar where they cross on the side nearest them. They then lace the rope to the pole by passing the rope over the opposite pole, round the outside of the pole, under the pole and over the previous turn (Fig. 32). The ropes are then carried across the poles from one side to the other at from 8 to 9 inch intervals and tied off at the opposite corner of the other end of the stretcher from which they respectively commenced. It will be seen that when applied in two pieces the rope handled by one bearer crosses the rope handled by the other in the centre of the stretcher.

As soon as the stretcher has been prepared, Nos. 2 and 4 place it on the ground, turning the stretcher over so that the transverse bars are underneath, in order to keep the stretcher off the ground.

The whole of the bearers then stand to stretchers as in "prepared stretchers" (see p. 27 for four bearers, p. 41 for six bearers).

The remainder of the drill is the same as for service stretchers.

When the drill is carried out with four bearers, it may be found difficult for Nos. 1 and 3, owing to having to bend so low, to lift a loaded "improvised stretcher." To overcome this, when Nos. 1 and 3 have taken up their respective positions at the foot and head of the stretcher between the handles, No. 1 grasps the left handle with his left hand, No. 4 grasps the right handle with his left hand. At the head of the stretcher No. 3 grasps the right pole with his right hand and No. 2 grasps the left handle with his right hand. All the bearers then rise together until the erect position is gained, when Nos. 1 and 3 grasp both handles, Nos. 2 and 4 letting go.

When the stretcher is raised, Nos. 2 and 4 adjust the slings found inside the tunics of Nos. 1 and 3 (Figs. 35, 36), and slip them on the handles, first on the side next them and then on the side farther off. Nos. 2 and 4 then fall into places as for prepared stretchers.

The improvised-stretcher drill is identical with that for the regulation stretcher after it has been prepared.

The improvised stretcher, when the order "**Close stretcher**" is given, is taken to pieces. Nos. 1 and 3 resume the poles and transverse bars looped on the



Fig. 36. — Sling as worn by bearer.

back, and, falling into their places, march off with the poles across their shoulders; or the poles and transverse bars are put on the cart or waggon.

The chief difficulty with the improvised stretcher is that of keeping the poles apart by the transverse bar. The lashings at the parts where pole and bar cross are apt to give when the patient is put on the stretcher. To obviate this many suggestions have been made. For example :—

1. A notched stick. This, unless artificially prepared, is impossible to obtain, as no tree branch has “forks” so arranged.

2. A notched board. This is less likely to split and is stronger than a stick (Fig. 29).

3. A board with apertures for pole handles. When the rope ends are tied round the poles and board where they meet, a rigid support is afforded (Fig. 30).

4. The sack stretcher is kept taut by a board slipped inside the mouths of the sacks at either end.

5. Tree twigs lashed to poles as transverse bars. These may be all that it is possible to obtain. Carefully and firmly applied lashings of twine or cord suffice to keep the poles apart and steady.

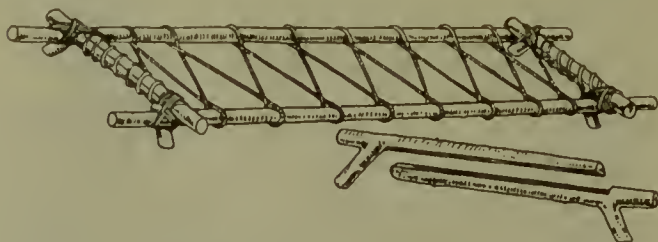


Fig. 37. — Showing two branching pieces of tree with opposing surfaces cut flat, then lashed together to form transverse bars.

CHAPTER VI

AMBULANCE WAGGONS

MILITARY regulation ambulance waggons are known as Mark V* (the asterisk indicating that this waggon is a conversion of the Mark V, once in use), Mark VI, and Mark I, a light ambulance waggon.

The details of construction and accommodation must be learned by an inspection of these waggons. It is necessary to be familiar with the waggons in order that when improvised conveyances are being provided, attempts may be made to secure as near an approach to the regulation waggon as circumstances will allow. For drill purposes also the regulation waggon must be practised with, so that a standard of training may be established, to be modified when necessary and when improvised waggons only are available. At the same time it must be remembered that during manœuvres or actual warfare, military ambulances may have to be handled by members of the Voluntary Aid Detachments.

Construction.—Military ambulance waggons may be defined as four-wheeled vehicles specially adapted to convey the sick and wounded. Two or four horses may be used according to the condition of the roads. The salient points of an ambulance waggon are these:—

The framework consists of stout beams so placed as to form an oblong frame on which the axles, spring, and the upright supports for the body and box-seat are fixed. The body affords accommodation for four stretchers, or for two stretchers and four (or six) men sitting; when no stretchers are in the waggon, twelve men sitting, six on either side, can be accommodated. The fore carriage has a driver's seat for accommodation of the driver and two patients. The wheels are tyred, and a brake under the driver's control acts upon the hind wheels. The

cover of the body is arranged over bale hoops let into slots on the side of the frame, with extra bale hoops in front and behind, to protect the driver and the tail-board. The wooden sides of the body are provided with louvred ventilators. Beneath the driver's seat are lockers, one for the driver's use, one for medical stores, and a third for "comforts." A water cask (or iron tank) capable of holding 10 gallons of water is fitted underneath the waggon, near the rear. Besides these, there are several other equipments, such as lamps, ladders to mount by, an apron for the use of those on the front seat, etc.

The interior of the waggon may be fitted as are the seats in an ordinary brake, six patients being seated on either side. When, however, stretchers are required for the wounded, two stretchers are placed on the floor and two on the seats immediately above, or, if only two stretchers are required, four men may be seated at the rear end, as the stretchers on upper compartment or seats can be pushed right up beneath the driver's seat. The wheels or runners of the stretcher on the floor rest on rubber pads to prevent slipping.

The St. John Ambulance waggons of various sizes may be used for one, two, or three loaded stretchers, with room for an attendant inside, and two slightly injured patients alongside of the driver. According to the distance, roads, etc., one or two horses are to be used. The general principles for loading waggons apply in the case of all waggons, with certain modifications which are readily understood during practice.

AMBULANCE WAGGON EXERCISES

For instructional purposes the squads are numbered by fours, as four stretchers are apportioned to each waggon.

The ambulance waggons are drawn up in single rank on the drill ground at four yards distance between near wheel and near wheel, the front of the waggons towards the rear. One bearer is told off as waggon orderly to each waggon. He lowers the seats and rails of the upper compartments and prepares the waggons for the reception of the wounded.

With Four Bearers

I. LOADING

“On Waggon Retire.”—The stretcher squads retire towards the line of waggon; the four squads on the left, as the line is retiring, proceeding to the waggon on the extreme left, the next four squads to the next waggon, and so on to the right of the line, closing in to two paces’ interval between the squads.

“Halt.”—When four paces from the tailboard of the waggon the word “Halt” is given, or the bearers halt without further word of command, especially during field work. The foot of the stretcher is now directed towards the tail end of the waggon (Fig. 38).

“Lower Stretchers and Fix Slings.”—The stretchers are lowered and the slings fixed as follows : Nos. 1 and 3 turn to the right, kneel on the left knee, pass the loop of grip-plate end over the near handle, grip-plate downwards, carry the sling under and round the opposite handle close up to the canvas, back to the near handle, round which two or three turns are made, pass the transverse strap round the pole between the runners and traverse, and fasten the buckle outside the sling between the poles; the bearers then rise and stand to stretchers. While this is being done the patient’s rifle and kit will be stored in the waggon by No. 2.

“Take Post for Loading.”—The bearers take up position as follows : Nos. 1 and 3 on the left, Nos. 2 and 4 on the right of the stretcher, No. 2 placing himself opposite No. 3 at the head of the stretcher, and No. 4 at the foot opposite No. 1 (Fig. 39).

As the squad is retiring upon the waggon, No. 2 bearer doubles out, places the patient’s rifle and kit in the waggon, prepares the waggon, and rejoins the squad.

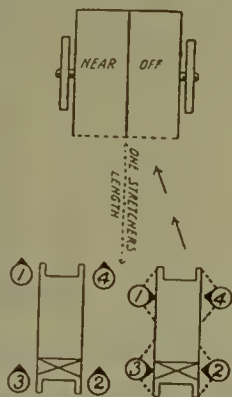


Fig. 38.—Position of stretchers and bearers before loading waggon.

“Stand Easy.”

The upper compartments are loaded first, commencing with the off side.

“Squads — Attention — In Succession from the Right — Load.” — When the squads are sufficiently advanced in these exercises, the Nos. 4 take charge of their respective squads, and give the following words of command:—

“No. (—) Squad—Attention—Load Waggon.”—On the command “Load Waggon” the Nos. 1, 2, 3 and 4 bearers turn inwards, stoop and grasp the poles of the stretcher, hands wide apart, palms uppermost; then, working together, they rise slowly, lifting the stretcher, holding it level at the full extent of the arms.

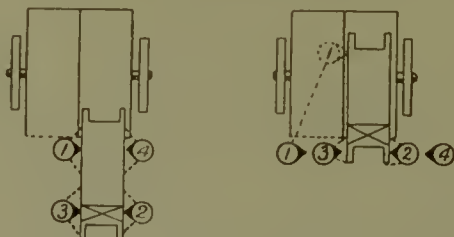


Fig. 39.—Position of bearers whilst loading waggon.

“Advance.” — The bearers advance towards the waggon with a side step, crossing their feet in front, the first step being taken with the foot nearest the waggon, halt one pace from the tailboard of the waggon, and lift the stretcher on a level with the floor of the upper compartment, place the front runners on it, Nos. 3 and 4 slightly raising the head of the stretcher.

The stretcher is then gently pushed into its place, Nos. 1 and 2 making way so that it may pass between them.

When the upper compartments are being loaded the stretcher is gently pushed into the waggon until the handles at the head end are plumb with the tailboard; Nos. 1 and 3 then enter the waggon, No. 1 going to the foot, No. 3 at the head end of the stretcher, and gently

push it into its place beneath the driver's seat, the handles showing through the holes made to receive them; the stretchers are now secured by means of the strap on the side of the waggon.

As soon as the stretcher is in its place, No. 4 gives the command—

“Re-form Squad—Quick March.”—On this command the bearers fall in as in file facing the waggon, wheel round to the right, and march to four paces behind and to the right of the remaining squads facing the field (Fig. 40).

“Stand Easy.”—The bearers who have placed their stretchers in the waggon stand easy until all the stretchers have been placed in the waggons, or until they are called to attention and marched off for further work.

As soon as the off (right side of waggon) upper compartment is loaded, the next squad is ordered to load the near (left) upper compartment.

When this is completed, the lower compartments are loaded in the same way.

In loading the lower compartment it is not necessary for Nos. 1 and 3 to enter the waggon.

When the waggon is fully loaded, the upper seats are securely strapped to the side of the waggon by the waggon orderly, and the tailboard of the waggon lifted and secured in its place.



Fig. 40.—Re-forming squad.

2. UNLOADING

The requisite number of squads is drawn up ten paces from and facing the tailboards of the waggons.

The squads are numbered by fours.

“Squads—Stand Easy.”—All the squads stand easy. The waggon orderlies prepare the waggons as for loading. The lower compartments are unloaded first, commencing with the off compartment.

When the squads are sufficiently advanced in these

exercises, Nos. 4 take charge of their respective squads and give the following words of command :—

“No. (—) Squad—Attention—For Unloading Take Post.”—The squad moves off towards the waggon, Nos. 1, 2 and 3 stepping short to allow No. 4 to place himself on right of No. 1 ; then the whole move forward in quick time, halting without further word of command one pace from the tailboard of the waggon.

“Unload Waggons.”—On the command “Unload Waggons,” No. 4 bearer takes a side pace (of 30 inches) to the right, Nos. 2 and 3 pass up between Nos. 1 and 4, No. 2 with his right hand and No. 3 with his left hand laying hold of the handles and raising the head of the stretcher about 6 inches, and gently withdraw it. As the stretcher is withdrawn, Nos. 1 and 4 seize the handles at the foot end and, taking the weight, lower it to the full extent of the arms, great care being exercised to keep the stretcher level and to avoid jarring the patient as the stretcher leaves the compartment.

“Retire.”—The squad retire and place the stretcher on the ground selected for this purpose, then stand to stretcher. No. 2 returns to the waggon for the patient's kit, etc.

“Stand Easy.”—Bearers who have finished unloading stand easy until the other stretchers are unloaded.

In unloading the upper compartments Nos. 1 and 3 enter the waggon as in loading, withdraw the stretcher until the handles at the head end are plumb with the tailboard of the waggon, then rejoin their squad, and the stretcher is withdrawn as previously detailed.

For Women

LOADING WAGGONS (SIX BEARERS)

The following drill is specially arranged for women, so that six bearers in place of four are always assisting to handle the stretchers in loading and unloading waggons. As the loaded stretchers are carried towards the waggons the squads (for drill purposes) are halted about ten paces from each waggon. No. 4 then gives the word—

“On Waggons Retire.”—On this command, the bearers step off towards the waggon, Nos. 1, 4 and 6 com-

mencing with the left foot, Nos. 2, 3 and 5 with the right foot, halting four paces from the tailboard of the waggon.

"Lower Stretchers."—The stretcher is lowered gently to the ground; slings fixed by Nos. 1 and 3 as at p. 59. No. 5 bearer (Fig. 41) moves round by the head of the stretcher to the right behind No. 4; the bearers stand to stretcher, Nos. 1, 2, 3 on the left, and Nos. 4, 5 and 6 on the right.

"Load Waggon."—No. 4 giving the command "Load Waggon," the bearers turn towards the stretcher and stoop, take hold of the sides, palms uppermost and hands wide apart, rise together, lifting the stretcher, retire towards the waggon by a side step, raise the stretcher to a level with the floor of the compartment, place the front pair of runners on the floor, and gently push the stretcher into its place, Nos. 1 and 4 and subsequently Nos. 2 and 5 bearers stepping aside as the stretcher is sent home. If necessary, one or two of the bearers enter the waggon to make fast.

"Fall in."—The bearers "fall in" in file facing the tailboard of the waggon, No. 1 in front (Fig. 44).

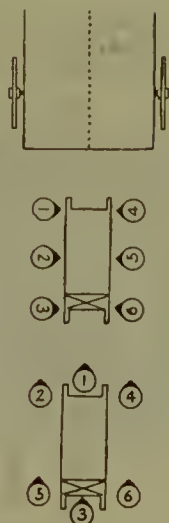
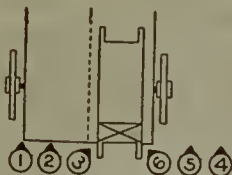
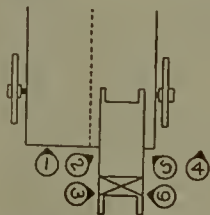


Fig. 41.—Bearers (6) at waggon, standing to prepared stretchers.



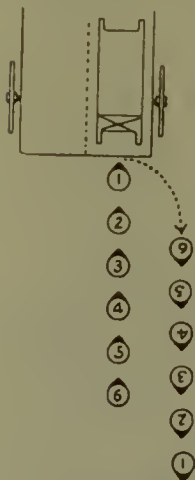
Figs. 42 and 43.—Bearers (6) loading waggon.

"Right Wheel—Quick March."—No. 4 gives this command, the squad march ten paces to the rear and halt.

A simpler movement is to "fall in" in line facing the waggon, No. 1 on right. The command will be "Right Turn—Right Wheel—Quick March."

UNLOADING WAGGONS (SIX BEARERS)

"Unload Waggon."—The squads retire on the waggons, halting one pace from the tailboard of the waggon, and Nos. 4, 5, and 6 moving up and placing themselves on the right of Nos. 1, 2, and 3; all turn inwards, Nos. 1 and 2 and Nos. 4 and 5 stepping back, Nos. 3 and 6 move up between them and, taking hold of the handles of the stretcher at the tailboard of the waggon, gently withdraw the stretcher, raising the head about 6 inches. The other bearers move up and assist in supporting and withdrawing the stretcher. As soon as the stretcher is clear of the waggon the bearers wheel round by the right and carry the stretcher ten paces from the waggon.



"Lower Stretcher and Unfix Slings."—No. 4 giving this command, the bearers lower the stretcher slowly and gently to the ground, unfix the sling, and stand to the stretcher as in prepared stretchers.

Fig. 44.—Bearers (6) in position after loading waggon.

UNLOADING STRETCHERS

No. 4 giving the command **"Unload Stretcher,"** the bearers place themselves as for loading stretcher.

When the patient is supported on the knees of Nos. 1, 2, and 3, No. 5 steps two paces back, whilst Nos. 4 and 6 pull the stretcher towards them, step between the handles, No. 4 at the foot and No. 6 at the head of the stretcher, carry the stretcher forward, placing it on the ground three paces from the patient's feet, return to the patient, and assist the other bearers in lowering him on to the ground or carrying him to his bed. The stretchers are then closed and the squads move off.



Fig. 1.—Mounting cart from the off (right) side.

When there are only head reins a cart is usually mounted from the near side.



Fig. 2.—Head-board being fixed to front of cart frame after removal of copse and ladder.

The trap-stick is partially seen in position to the man's left and on a level with his waist.

CHAPTER VII

EXERCISES WITH GENERAL SERVICE WAGGONS OR COUNTRY CARTS CARRIAGE BY HORSES

GENERAL SERVICE WAGGONS OR COUNTRY CARTS

It may be necessary to employ general service waggons or country carts for the transport of the wounded. When used for this purpose they should have a plentiful supply of straw, hay, dried leaves, or bracken strewn over the floor and sides.

With a little ingenuity, bundles of the material used can be tied up and fashioned into pillows. If mattresses and bedding are available, these should be laid on the top of the straw for the patient's use in transport.

If possible, all waggons and carts should, prior to their being taken into use, have covers fitted to them, which ensures at least a partial protection from the sun and weather. They should be thoroughly overhauled, special attention being paid to the working of the brakes, the condition of the axles, and of the linch-pins where these are used.

When vehicles of different types are being used, they should be classified according to their suitability in various degrees for the carriage of wounded men; for example, when patients who are seriously wounded or dangerously ill have to be carried, heavy draught waggons are recommended for the purpose, in preference to vehicles of light construction.

In loading general service waggons or carts, stretchers and patients are drawn up on the parade ground, as detailed for ambulance waggon exercises, and the same steps taken to load and unload as in the case of those waggons. In loading, however, the Nos. 1 and 4 of each squad, after the end of the stretcher has been placed on

the floor, get into the waggon and, with assistance of the other bearers on the ground, lift the stretcher into position and unload it.

When patients, with or without stretchers, are placed in a two-wheeled cart they must be laid with the head towards the horse, as the floor is on the slope, the front of the cart being higher than the tail-board (Plate iii., Fig. 1). When a four-wheeled cart is in use the patients are laid as in ordinary waggon drill, as the floor of these vehicles is level.

The patient should be placed in the most comfortable position, special care being taken to support the injury so as to prevent its movement during transit, No. 4 giving the necessary instructions for the careful handling of the patient and removal of the stretcher.

This method, suitable for seriously injured cases, requires that there should be a sufficient space in the vehicle for its accomplishment. After one or more patients, according to the size of the vehicle, have been placed on the mattresses, &c., others less seriously injured may find sitting accommodation in the cart.

Occasionally it may be necessary to dispatch a patient on a stretcher, in which case the stretcher is carefully lifted into its place as already described, and secured in its place by means of straps or rope lashing. (Plate ii., Fig. 2, and Plate iii., Fig. 1.)

Various means may be improvised for this purpose, with the object of minimising the jolting of springless vehicles. The principle most generally adopted is that of fixing poles or branches of trees across the cart, secured to the sides, and slinging the stretchers from the poles by means of ropes. (Fig. 46.)

Sometimes lying-down cases have to be put into a two-wheeled cart without stretchers, none being available.

When this happens, the bearers, following as far as possible the instructions given for lifting the wounded in Stretcher Exercises (p. 28), lift each wounded man and carefully carry him to the cart. On arriving at the back of the vehicle, No. 4 (or the bearer directed by him) gets into it, and, supporting the wounded man under both shoulders, lifts him in head first, assisted by the other bearers, who subsequently get into the cart

and help to place the wounded man in the most comfortable position.

Unloading is the reverse of this proceeding.

A general service waggon holds six patients sitting up, with their arms and accoutrements; to them may be added two patients able to walk and ride by turns; or two patients lying, without stretchers. Three may be carried lying down if their injuries permit of it, two with their heads one way, the third with the head in the opposite direction.

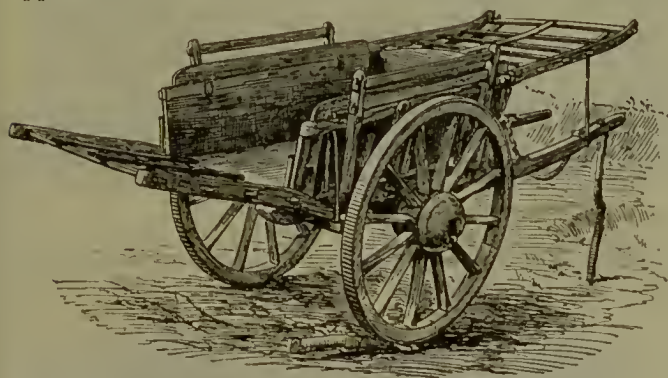


Fig. 45.—Country cart, the V.A.D. “ambulance waggon,” with copse and ladder fitted.

The two-wheeled or four-wheeled farm cart is the real ambulance waggon of the Voluntary Aid Detachments. It is necessary, therefore, to be acquainted with their structure and their named parts.

Two-wheeled Cart.—The ordinary farmyard cart (Fig. 45) can be utilised when the tailboard is let down, and can be slung by its chains in various ways:—

1. Hay or straw may be laid in the bottom of the cart to the depth of from 6 to 8 inches, and two patients laid thereon side by side. 2. The loaded stretcher may be laid on the hay. 3. The stretcher may be slung from cross-bars placed athwart the cart from one side of the frame to the other. (Fig. 46.)

The two-wheeled farm cart varies somewhat in almost

every county, but for practical Ambulance purposes the differences may be neglected, as every variety is capable of being utilised for the conveyance of the wounded.

Measurements.—A two-wheeled farm cart has, as a rule, the following measurements:—

		ft.	in.
Width	{ Bottom of cart.....	3	6
	{ Half way up sides.....	3	9
	{ Top of frame	4	0
Length	{ Body of cart.....	5	6
	{ With tailboard let down (18 in.)	7	0
Depth from highest level of frame	{ from ...	1	10
	{ to ...	2	6

The width of the cart would allow two stretchers 18 to 20 inches in width to be laid in the straw or hay at the bottom.

The length of the cart would allow two men of average height (5 feet 6 inches) to be laid in the straw or hay with the tailboard up. With the tailboard down

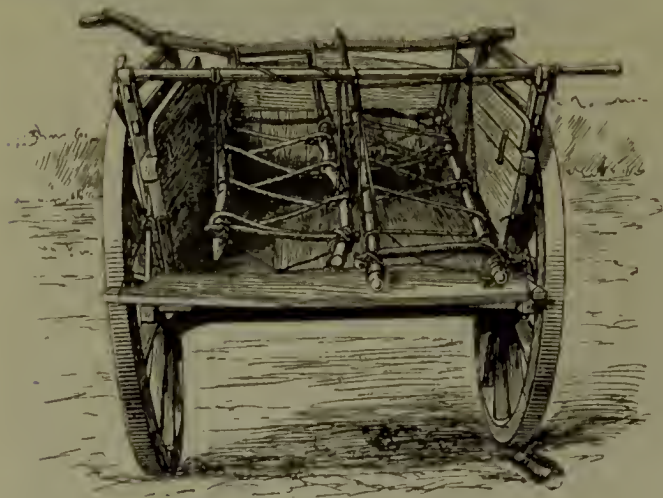


Fig. 46.—Method of slinging two stretchers in a cart.



Fig. 1. Cart tilted for cleaning.

The trap-stick is detached and held up to view. Observe the rest-props in use.



Fig. 2. Stretchers in cart steadied with lashings of rope.

Observe the tailboard standing against wheel.

and slung or fixed to the back of the cart on a level with the floor, a stretcher of over 7 feet long could be

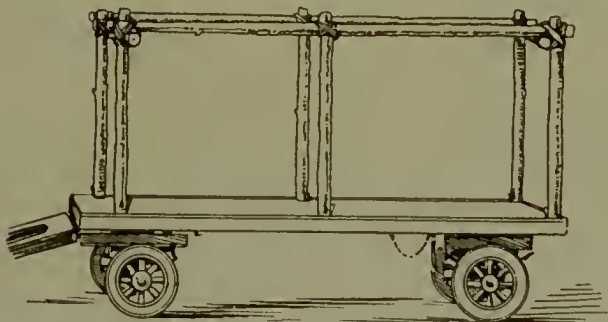


Fig. 47.—Trolley with sticks fixed in holes in floor to support cover; cricket stumps may be used as supports laid; in fact, a regulation stretcher of 7 feet 9 inches could be accommodated, as the handles project $10\frac{1}{2}$ inches

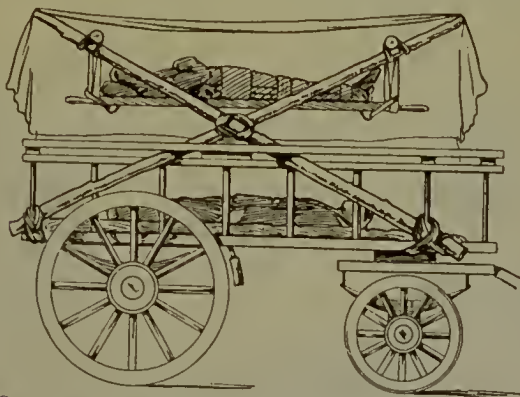


Fig. 48.—Four-wheeled country waggon, with frame from which stretchers can be slung.

beyond the runners, so that the back runners of the stretcher would still be a few inches inside the extreme edge of the tailboard.

The depth of the eart is important from the point of view of slinging the stretcher so that the patient may not be subjected so severely to the jolt of a eart having no springs, espeially on a rough road. Even in conveyances with springs, stretchers ought to be swung when possible, as the springs favour a latitude of movement unsuitable to patients with fraetured lower limbs more espeially.

Summary of Choice, Examination, and Preparation.—To ehooe, examine, and prepare a farm eart—

1. See that it is elean, at any rate on the inside. To elean a eart, undo the eatch in front and tilt the body of the eart. (Plate ii., Fig. 7.) The eatch may be a trap-stiek or a bolt.

2. If there is a ehooice of earts, ehooe those with the least shake in the wheel on the axle. To test this, grasp the wheel by the top and shake it from side to side. There must be always some lateral movement (shake) to the wheel on the axle.

3. The broader the tyre of the wheel, the more smoothly will the eart travel.

4. Examine the wheel as to the eondition of the tyre, the spokes, the axle, the nave, and the linch-pins.

5. See that the axle as it passes through the nave is well greased.

6. See that the trap-stiek is properly fixed, otherwise the eart will tilt when loaded.

7. Examine the frame, the eaves at the sides, the ehain or rope ties for the tailboard.

8. See that in four-wheeled vehieles the drag-prop is in good eondition and available for use.

Hand Carts.—(a) The Carriage Ambulance Stretcher Mark I., approved for the Army, is a two-wheeled vehiele, with a straight axle and springs in which a military stretcher can be aeoommodated. The body of the earriage consists of a transverse seat for the stretcher carrier, to which it is bolted. The carrier consists of two boards about 30 inches long but eapable of being lengthened; they present an L-shaped slot in either side for the stretcher poles to lie in. The stretcher, when in place, is fixed to the carrier by tightening serews to prevent slipping and jolting. By



Fig. 1.—Two-wheeled cart with loaded stretchers.

The upright stakes are to support the cover.



Fig. 2.—Two-wheeled cart loaded and covered.

the L-shaped slot and the screws lateral and fore-and-aft movements of the stretcher are prevented. Two movable iron legs are at each end of the carriage and on opposite sides; these are lowered or turned up and fixed in a clip on the under side of the carrier.

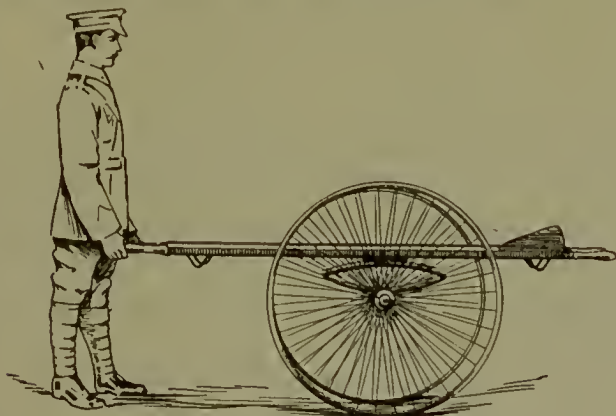


Fig. 49.—Wheeled litter.

(b) Police ambulance litters are made to take a police stretcher; a hood can be attached to the litter.

(c) The "Furley-Ashford Litter" is characterised by a bent axle so close to the ground that on lifting the



Fig. 50.—Wheel-barrow as litter.

stretcher the bearer at the head can walk forward between the wheels, stepping over the axle. This is a great advantage, as with a straight axle the stretcher has to be lifted sideways over the wheel. With a loaded stretcher this is difficult and *may* be dangerous.

CARRIAGE BY HORSES

1. If the patient is slightly injured a comrade may mount behind the patient, pass his arms round the patient's body and support him. If dismounted, the injured man, if capable of so doing, may mount behind a comrade; to facilitate his mounting the patient is given a stirrup and is pulled up into place.

2. If the patient is severely injured, he is mounted in front of and facing a comrade, so that if faint he is supported. If the patient is unable to mount yet able to assist in supporting himself, the stirrup on one side is lengthened and he is placed face downwards across the saddle with one foot in the lengthened stirrup.

3. If the patient is insensible, throw a horse cloth or blanket, etc., over the saddle; lift the patient astride on to the horse's withers (shoulders), in front of the saddle and facing the tail; the patient is then bent forwards over the cloth on the saddle and the horse led. To fix the patient more securely in place, cross the stirrup leathers over his back and secure the stirrup in place by a rope, puttees, etc., passed under the horse's belly.

To remove a man seriously injured from horseback, let one man hold the horse's head; disengage the feet from the stirrups and remove spurs. If no bone or limb is broken, one bearer stands on the near (left) side of horse facing the patient, a second bearer goes to the off (right) side of horse and gently lifts and pushes the patient's right leg so that he is tilted to the side on which No. 1 bearer stands; the patient then is received by No. 1 bearer, when No. 2 comes round, and the patient is gently lowered to the ground or on to a stretcher. If a bone in the lower limb is broken, three bearers are required. All stand on the wounded side, one man takes charge of the injured limb, a second lays hold of the pelvis from behind, whilst a third stands so that the patient can fall towards him; when the patient throws his arms round the bearer's neck, he is gradually removed and gently lowered. If the upper limb is injured, the bearer approaches the patient on the sound side and the patient is gradually pulled towards the bearers and lowered.

CHAPTER VIII

CONVEYING WOUNDED BY HAND METHODS

CARRYING BY ONE BEARER ONLY

1. To help a patient with an injury to one lower limb other than a broken bone. Suppose the patient to be suffering from a sprained left ankle or crushed left foot. The bearer stands close to the patient on the left side (same side as injury), brings the patient's left arm round his neck, and seizes the patient's left wrist with his left hand. The bearer passes his right arm round the patient's waist. The patient now bends the left knee to keep the foot off the ground, and hops whilst the bearer walks (Fig. 51). This manœuvre may be carried out at a running pace.

The bearer is sometimes recommended to stand on the opposite side to the injured limb; this is not advisable.

A man suffering from an injury to the head, neck, or one arm may be helped along by this method, and, except in the case of injury to the arm, the bearer may stand on either side of patient, but when the arm is injured the bearer takes post on the sound side.

2. To help a patient when the leg is broken. After the leg is securely put up in splints, the bearer, by passing one or two bandages or belts under the fractured limb, can support the limb whilst the patient, on his hands, hips, and one foot, shuffles along to shelter, progressing either forwards or backwards.

3. The patient may be carried pick-a-back if his injury permits of this form of transport (Figs. 52, 53, 54).

4. The patient may be carried by the fireman's lift. This is especially suitable in cases of insensibility. The steps to be observed in this form of lifting are :—

(1) Roll the patient over in the prone position; that

is, front of body on the ground or floor; bring the arms to the side.

(2) Kneel down with a knee on either side of the patient's head, pass your hands, palms uppermost



Fig. 51.—One-bearer help :
sprained left ankle.



Fig. 52.—Patient carried on
back.

beneath his armpits; raise him as high as he can be lifted in the kneeling position. Some prefer to raise the patient without kneeling.

(3) Shift your arms downwards until they encircle the patient's waist, clasping the hands over the small

of the back, and, rising from the kneeling posture (should this have been adopted), lift him to the upright position.

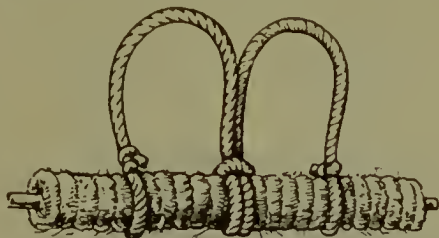


Fig. 53.—Straw-rope round pole, with loops for shoulders, for "pick-a-back" carriage.

(4) Seize the patient's right wrist with the left hand, and carry the right arm round your neck. Stoop until your right shoulder is opposite his right groin, and at

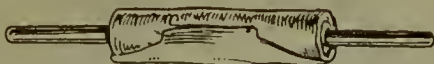


Fig. 54.—Coat folded round stick for use with rope loops for "pick-a-back" carriage.

the same time pass the right hand round his thighs (or round right thigh only) and bring his weight well on the centre of the back.

(5) Release the patient's right wrist that is being grasped with your left hand, seize his right wrist with your right hand, and assume the erect position.

CARRYING BY TWO BEARERS

I. INJURED PATIENTS WHO CAN SIT UP

1. **Rifles.**—Although the new pattern rifle is too short to constitute a satisfactory stretcher for a patient lying down, for patients who can sit up it can be utilised as follows:—

One of the bearers removes his own coat, passes

his hand down one sleeve from the inside of the coat as far as the cuff, seizes the cuff, and, pulling on the sleeve, turns it inside out. The same procedure is followed with the other sleeve. The coat is now buttoned in the ordinary way and laid on the ground, buttons downwards. A rifle is next passed along either sleeve, so that the coat lies midway along the rifles. The injured man is seated on the coat, and when the stretcher is lifted the coat serves as a seat and the injured man rests his back against the rear bearer.

Broom handles, the shafts of hay forks, scouts' poles, or stout straight pieces of wood or iron can be utilised in the same way as rifles for a seat stretcher.

A Sack as a Seat.—The seat for the patient can be improvised from a sack with holes made in the sacking near the top and bottom of the sack on either side, or from any stout piece of matting, tarpaulin, etc. The poles are passed through the holes in the sacking and the patient is carried as described above with rifle and coat.

2. Fore-and-Aft Method.—Should there be no materials at hand whereby an improvised seat stretcher can be made, the bearers can employ the fore-and-aft method, whereby the patient, if not seriously injured, can be carried. One man standing behind the patient passes his hands and forearms beneath the patient's armpits; the other gets between the patient's knees, back to patient, and stooping down passes his hands beneath the patient's knees from the outside; both bearers stand up, lifting the patient, the front bearer having a lower limb on either side of his body.

HAND SEATS

Hand Grips.—The hands to form the seat may be grasped in one of three methods:—

1. Fingers interlocked — the “elasp-hand” or “prayer-grip.” The bearers face each other. Opposite hands are presented to each other palms upwards, the fingers straight and spread out. The fingers are interlocked and the hands clasped. The palms of the hands thus elapsed should be brought together to prevent strain on the fingers. (Fig. 55.)

2. Fingers hooked—the “hook-grip.” Each bearer bends his fingers at the second joint, one bearer with back of the hand uppermost, the other with back of the hand downwards. The bent fingers are hooked



Fig. 55.—Two-handed seat : “clasp-hand-grip” with hands on shoulders.

together. (Fig. 56.) A handkerchief between the fingers eases the strain on the fingers, or gloves may be worn.

3. The “wrist-grip.” One bearer presents his hand palm upwards, the other palm downwards, and passing the hands, the former below the hand of the latter, grasp each other's wrists.

Hand-Seat Practice Drill

The bearers are drawn up in double rank. They are presumed to be "sized" and "standing at ease."

Words of Command: "Attention," "Number,"



Fig. 56.—Two-handed seat : "hook-grip," with hands on hips.

Odd Numbers Right Files," "Even Numbers Left Files."

"Form Two-handed Seats."—Right files turn to the left; left files turn to the right. The bearers thus face each other. The right bearers advance their right hands, the left bearers their left hands, and join hands

(by prayer-hook or wrist-grip). Where the hook-grip is practised, the right bearer turns back of hand uppermost, the left bearer back of hand downwards. Disengaged hands are placed on each other's shoulders or hips, grasping the clothing if necessary (Figs. 55 and 56).

"Files Right and Left Turn."—Files resume position of "attention" and turn to the original direction.

Lifting Patients from the Ground.—When lifting a patient from the ground by the two-handed seat, the bearers stand facing each other on either side of him, opposite his hips. They then stoop or kneel down on one knee and pass one hand under and just above the centre of the thighs, and clasp the hands when they



Fig. 57.—Straw ring as a seat for patient when being carried, in place of clasped hands.

meet; the other hands are passed behind the patient's back and a grip is taken either round his waist or of his clothing, or of the opposite bearer's clothing, and the two rise together, keeping the shoulders at the patient's back fairly close together to prevent him from falling through between their arms as they support the thigh and back. The bearers then move off together, the one on the patient's right with his right foot and the one on the left with the left foot. The patient, when he can use his arms, encircles the bearers' necks.

The "Double" Two-handed Seat.—The bearers, facing each other, clasp both hands of the opposite bearer. This seat can only be used when the patient can stand up, if only on one foot, and pass his arms round the bearers' necks, and thus support himself without the bearers' arms at his back.

The bearers' hands are passed just above the knees and under the hips. It is possible to carry the patient farther by this method, and with less strain on the fingers.

Three-handed Seat.—The bearers face each other. The odd number grasps his own left forearm just above



Fig. 58.—Three-handed seat with hand disengaged for supporting lower limbs. If lower limbs are sound, the hand to be placed on shoulder.

the wrist. The even number grasps the right forearm of the odd number with his left hand, and the odd number now grasps the left forearm of the even number with his left hand. The even number places his right hand on the left shoulder of the odd number. As this



Fig. 60.—Four-handed seat.

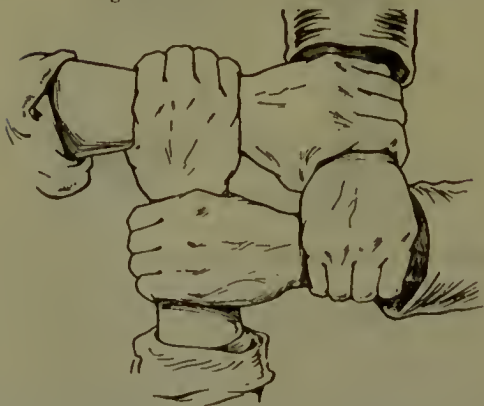


Fig. 61.—Position of hands in four-handed seat.

the right limb (Fig. 59). When the patient's left limb requires support this method is reversed, so that the left file has the left hand free.

The Four-handed Seat.—Bearers face each other. Each bearer seizes his own left wrist with his right



Fig. 62.—“Human stretcher.” One hand supports the head, another supports the lower limbs. The hands in centre are joined by “clasped-wrists” method.

hand, and, approaching the hands, each grasps the opposite bearer's right wrist. The patient can then seat himself on the four hands and encircle the bearers' necks with his arms. If the patient cannot rise, he can “sit” on his hands while the bearers stoop down and form the seat beneath his hips. (Figs. 60, 61.)

The "Human Stretcher."—The bearers face each other. The odd number takes a side pace to his right and advances his left hand to meet and grasp the even number's left. Both bearers then advance their disengaged hands and hold them in position to support the



Fig. 63.—"Human stretcher" loaded.

patient, the odd number supporting the lower limbs, the even number supporting the head, neck and shoulders. The clasped hands must be passed immediately under the patient's hips. By the "human stretcher" the patient can be carried for some distance in the horizontal position and laid on the stretcher

or removed from the stretcher to the bed by two bearers. (Figs. 62, 63.)

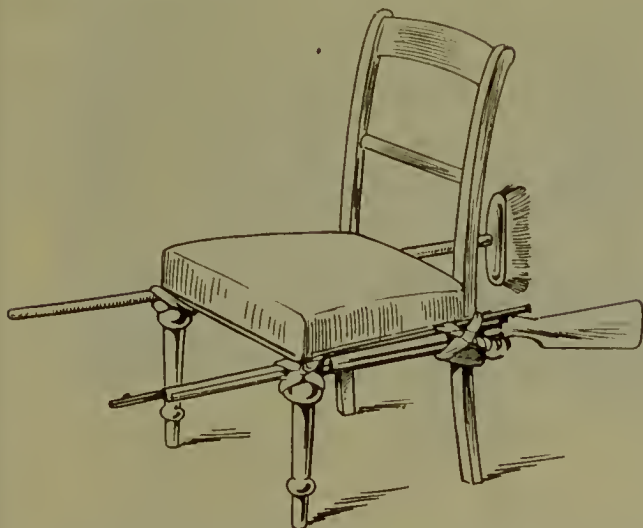


Fig. 64.—Carrying-chair.



Fig. 65.—Chair fixed on poles with four bearers.

Carrying-chairs.—A chair can be utilised for carrying purposes by lashing poles, or a broom and a rifle, beneath the seat. (Fig. 64, and Plate iv., Fig. 1.)

Four Bearers to a Chair.—A chair lashed on long poles may be carried by four bearers. The poles are slung at either end to bars which are supported upon bearers' shoulders. (Fig. 65.)

Eight Bearers to a Stretcher.—The handles at either end of the stretcher are slung from cross-bars, as shown at Fig. 66, B. Other bars (four in all) are laid at right angles across each end of each cross-bar and fixed by lashings. Eight bearers now arrange themselves as shown in Fig. 66, A. A deck-chair, to which long poles

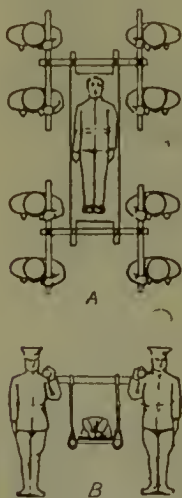


Fig. 66.—Stretcher with eight bearers. A, bearers in position, with poles on shoulders. B, showing how stretcher is slung from cross-bar.

have been fixed, may be similarly arranged for carriage by eight bearers. (Plate iv., Fig. 2.) Carriage by eight bearers is by far the most comfortable method of conveying wounded, and the distance possible to be travelled by the bearers is far greater than by any other arrangement. The bearers' shoulders where the bars rest can be protected by pads, and the right and left bearers may change sides from time to time. No previous training is necessary for conveyance by this method, so that the services of untrained helpers can be utilised.



Fig. 1. Deck chair for two bearers, with cricket-net poles lashed to chair legs.



Fig. 2.—Deck chair for eight bearers.

CHAPTER IX

METHODS OF CARRYING STRETCHERS OVER OBSTACLES

As a broad rule, stretchers should not be carried over obstacles, but in preference a detour should be made. A gate should be chosen in preference to passing the stretcher over hedges or walls, and a bridge in preference to conveyance over ditches or streams. When these obstacles cannot be avoided the following methods should be adopted.

1. **Hedges.**—The hedge may be cut or trampled down, but when this cannot be done the stretcher

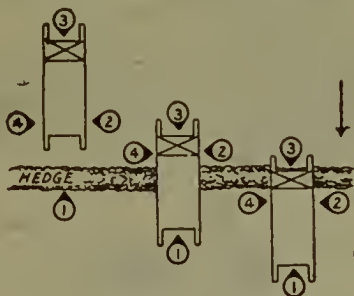


Fig. 67.—Crossing a hedge.

should be carried close to the hedge and placed on the ground. No. 1 gets over or through the hedge whilst the stretcher is raised by the other bearers, as shown in Fig. 67. When the stretcher is passed sufficiently over for No. 1 to grasp the handles, Nos. 2 and 4 also cross the hedge and assist No. 1. Finally No. 3 gets over the hedge.

2. **Walls.**—Bearers stand to the stretcher as for loading waggons. The stretcher is raised and the front pair of runners placed on the top of the wall.

Nos. 1 and 4 climb over the wall, the stretcher is then carried forward until the last pair of runners rest on the wall. Then Nos. 2 and 3 bearers climb over and the stretcher is lifted from the wall, placed on the ground, and bearers stand to stretcher. (Fig. 68.)

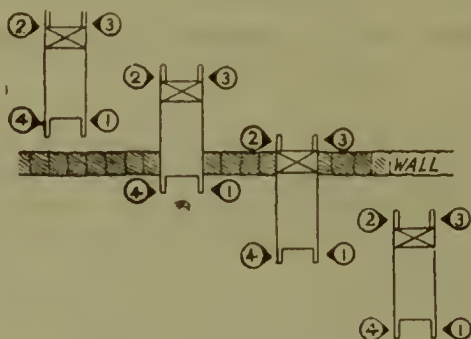


Fig. 68.—Crossing a wall.

3. **Ditches.**—The stretcher is placed on the ground at one side of the ditch. No. 1 crosses the ditch to the opposite bank. Nos. 2 and 4 enter the ditch and support the stretcher as it is glided on by No. 3. When the handles are reached by No. 1, Nos. 2 and 4 pass

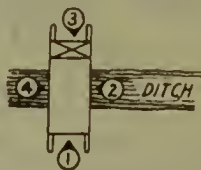


Fig. 69.—Crossing a ditch.

the stretcher on. When the stretcher reaches the opposite bank, No. 3 crosses and falls into place with the other bearers at the stretcher. (Fig. 69.)

4. **Landing Stretcher on a River Bank.**—If the stream is shallow, so that bearers can wade, the drill is as for loading waggons. Nos. 1 and 3 on the left, Nos. 2 and 4 on the right. All face the stretcher and support

it. On reaching the bank the stretcher is lifted level with the bank, the foot of the stretcher being placed on the bank (Fig. 70). Nos. 1 and 4 get on the bank and glide the stretcher along until well away from the edge. The bearers then stand to stretcher.

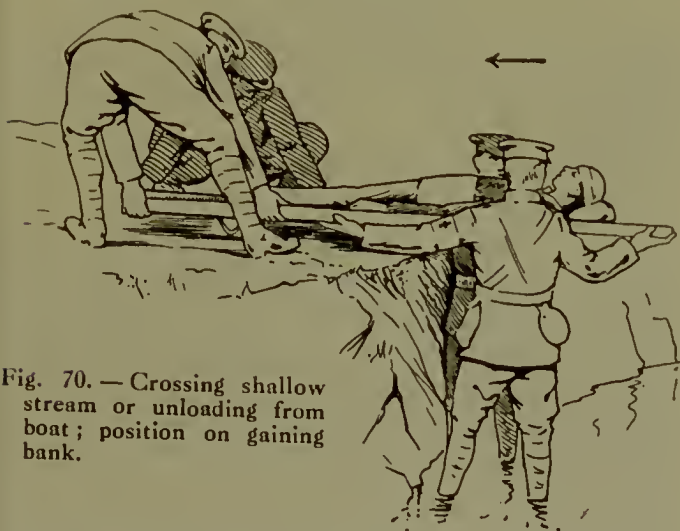


Fig. 70. — Crossing shallow stream or unloading from boat; position on gaining bank.

This method can be adapted when unloading from boats where the water is too shallow for the boat to come close in to the bank.

CHAPTER X

SANITATION

WHETHER a camp is for military, medical or purely "pleasure" purposes, its sanitation is based upon similar principles.

In selecting a site for a hospital in the open or a camp the following points should be considered :—

Nature of the Soil.—Dryness of the ground is a primary consideration. To pitch tents in a soil saturated with moisture, or even at the bottom of a declivity whither the subsoil draining from the neighbouring height must tend, is unwise. It must be remembered that the temperature of a tent is always above that of the surrounding atmosphere, especially when occupied at night, and the evaporation in the area covered by the tent will be thereby increased, inducing emanations of vapour from the ground calculated to cause rheumatism in the form of lumbago, stiff neck or aching limbs, or more evil consequences still. Clay soil is regarded as more dangerous than a loam or gravel soil; but if the weather is dry, a clay soil baked by the sun is perhaps as wholesome a surface to pitch tents upon as can be found. Gravel or loose soil allows the water to sink, but when the weather is hot, evaporation must ensue and the moisture will accumulate within the tent if rain has recently prevailed. Prolonged discussion of the choice of soil in which to pitch a camp is, however, profitless, for the area in which engagements are fought is not determined by the nature of the soil but by the exigencies of war. Where choice is at all possible it is well to select pasture-land in preference to ploughed land, a stubble field in preference to a field of clover or long grass.

Site.—If in a valley, a knoll or piece of ground elevated above the lower levels should be chosen, in case a stream or river should overflow its bank. A southerly aspect, so that the sun may shine on the camp during the

greater portion of the day, is necessary, for sun-penetrated air is health-giving from every point of view. In an undulating country the side of the hill is preferable to the foot, so that the rain may readily run away, and the drainage of the camp generally be facilitated.

Shelter from the prevailing wind in cold weather must also be thought of and provided for by taking advantage either of the slope of the ground or of an adjacent high hedge or clump of trees. Avoid a wood when possible, as the ground is often damp, the drip from the trees in wet weather is a disadvantage, there is the difficulty of finding the camp by men unacquainted with the district, and the danger of fire in very dry weather.

WATER

Of all requirements, the first and foremost to be thought of is the proximity of a wholesome and plentiful supply of water. The possible supply may be from a lake, a river, or a well.

Lakes.—As a rule water from a lake of even modest dimensions is safe to drink. The water should be taken as far from the shore as possible, especially when reeds, rushes or water plants border the lake. A platform of a few stakes driven into the ground from the lake margin and covered by planks, by small tree trunks, or by a ladder with a plank of wood laid upon the rungs lengthwise, will suffice to allow the water to be drawn from a point beyond the shore vegetation.

Ponds.—Even in upland districts small roadside ponds should never be used as a source of water supply for human beings; but animals may and do drink such water with impunity.

Rivers.—Unless contaminated by receiving the sewage of a town some distance above the site of the camp, water from a river or stream is, as a rule, wholesome. The water should be taken from as near the centre of the stream as possible, and a platform (*see* above) should be erected to allow of this being done, or a boat or, still better, a punt anchored so that it lies at right angles to the course of the river—i.e. having one end projecting straight out into the stream whilst the other end nestles on the shore.

Muddy Water.—The water may be wholesome but muddy, especially in times of flood; to get rid of this turbidity various devices are to hand:—

1. The Barrel Filter.—At some distance from the river bank place a few large stones or bricks on which the barrel may stand. The bottom of the barrel is perforated by several holes. Into this put a layer of pebbles and gravel, and stand on these a smaller barrel, which has a number of holes perforated in its sides, near the top. Fill up the interval between the barrels



Fig. 71.—Barrel standing in a river bed.

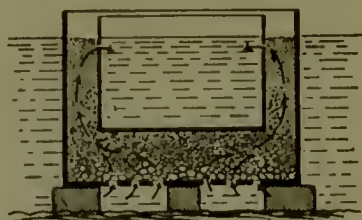


Fig. 72.—Boxes, one large and one smaller, with sand between, used in place of barrels.

for a foot or two with gravel and sand. The water now enters through the holes in the bottom of the large barrel, filters upwards through the gravel, etc., and gains entrance to the small barrel within through the apertures in its sides near the top. By this means any mechanically suspended material in the water is prevented from reaching the inner barrel, but, of course, this plan of filtering water has no effect in removing micro-organisms. (Fig. 71.)

2. Boxes with Sand as Filter.—The principle of this device is the same as that of the barrel filter (Fig. 72).

3. Biscuit Tin as Filter.—Bore a few holes in the bottom of the tin, stand it on stones or stakes a foot or two off the ground, fill it up first with pebbles, then with gravel, and sand on top. Pour the water into the sand gradually and gently; the water trickles through

the filter, and is caught in receiving vessel below (Fig. 73).



Fig. 73.—Biscuit tin as filter.

4. Sack as Filter.—Sling a sack from a tripod by several (four or six) pieces of stout twine tied, at equal distances apart, to the mouth of the sack. Pour the water to be filtered into the sack mouth and receive it in a pan or other vessel placed beneath. (Fig. 74.)

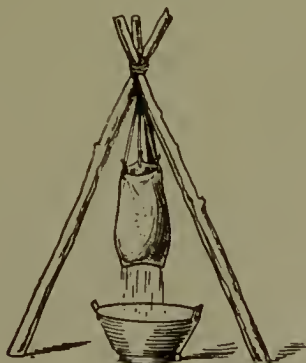


Fig. 74.—Sack as filter.

5. Sheet as filter.—This method of filtering is sufficiently explained by the diagram (Fig. 75).

6. Aids to Settling.—Water loaded with a quantity of suspended matter will, if allowed to stand long enough, clear by most of the suspended matter falling to the bottom of the vessel. To hasten the process, *alum*, in the proportion of about 5 grains to each gallon of water,

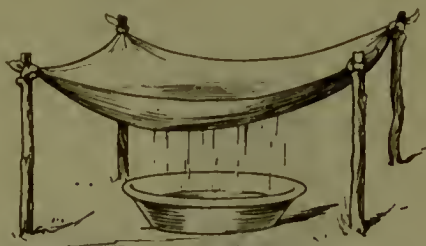


Fig. 75.—Sheet as filter.

may be sprinkled on the top of a jar or bucket of water, or alum in similar proportion may be put in a muslin bag, and suspended so as to be just submerged in the surface of the water. In a few hours the water will clear and may be used. The alum also softens the water.

By the addition of *permanganate of potash* to offensive water in a well the smell is removed by organic impurities becoming oxidised. To an ordinary-sized well 4 oz. of permanganate of potash crystals and 1 oz. of sulphuric acid are added.

Ordinary Filters.—There are many filters both for domestic use and for military purposes in the field.

The charecoal filters in ordinary use are not to be relied upon; they do not remove any of the micro-organisms, and in fact, usually left uncleaned for months together, they still further pollute the water by adding more micro-organisms as the water passes through it.

Of the filters in use for military purposes the Pasteur-Chamberland and the Berkefeld are the best known, but even these require brushing and sterilising from time to time; they are also useless for muddy water, unless the mud and slime are first removed by sand filters or by precipitation with alum.

Boiling.—Clear water may be boiled at once; muddy water should be filtered by one of the means men-

tioned above. By boiling water and keeping it at the boil (212° F.) for at least ten minutes, all pathogenic (disease-causing) organisms are destroyed, and the hardness of the water is removed. The disadvantages of boiling water are not only that a large quantity of fuel is consumed and that the water takes some time to cool, but also that owing to the gases being driven out of the water it becomes flat and tasteless. To overcome the insipid taste the water, if in small quantity, may be aerated by being shaken violently in an open vessel or unstoppered bottle only partly filled, or if in large quantity the water may be poured on a fine sieve and received in a tub, vat, or other large vessel. As boiling water is required to make tea, coffee, barley, rice, lemon juice, toast, etc., there is less danger that water which is only heated, and in which the germs are not destroyed, will be used; these substances serve also to impart a flavour and the boiled water is rendered palatable and, it may be, nourishing.

Wells.—Well water may be good or bad according to the character of the well from which it is drawn.

Deep wells, such as those met with in the centre of the village green from which the people draw their supply—the village well or pump—are as a rule wholesome; were it otherwise, the entire village would become affected with an epidemic of some kind, such as typhoid (enteric), diarrhœa, dysentery, cholera, etc. In the absence of such illnesses the water may be presumed to be fit to drink.

If, however, the well is *shallow*, say, 25 feet or under, in contradistinction to a well 100 feet deep or more, it is usually found in the compound of the house or cottage adjacent to the dwelling, to stables, piggeries, cowsheds, or manure-heaps. The soakage from these may gain direct access to the well, or may pass through the soil in chinks or fissures, and, pouring into the sides of the well, pollute the water. As a rule, all wells adjacent to farm buildings or dwelling-houses must be viewed with suspicion, and either they should be put out of use or the water from them should be boiled before being used.

Rain Water.—If stored in properly provided tanks under cover, so that no flies, mosquitoes, rats, mice, or

frogs, or such inanimate matter as dead leaves, can gain access to the tanks, rain water may be used, as a rule, without dread of illness, especially if collected from roofs covered by slates in country places.

The rain water, however, collected in open barrels alongside of houses from water spouts is not fit for drinking purposes. In summer it may be seen to be swarming with the larvæ of insects, and if examined by a microscope will display multitudes of fine organisms in active motion. This water should always be boiled before being used, and should be first filtered through fine muslin or linen so that the grosser organisms may be first removed.

Springs.—Water issuing from the ground in the form of a spring is merely ground water which reaches the surface after percolating through a surface stratum of permeable soil. When, however, the soil changes to an impermeable layer such as clay or rock, the water finds exit at a dependent point. If the soil through which the rain as it falls passes (and becomes ground water) is free from impurities, the spring water may be accepted as wholesome; but if the soil is cultivated soil on which farmyard manure is strewn, or if the water issues from near a graveyard or from any surface in which the decomposing remains of plants or animals are present, it is to be regarded with suspicion, and ought not to be used without confirmatory tests of its purity.

Small Streams.—Water from a small stream running down a declivity or hill-side, where there is neither cultivation nor other chances of contamination, may be accepted as suitable for drinking purposes.

Quantity of Water.—Although in large towns the amount of water required is put down at 30 gallons per day per head of the inhabitants, this quantity is usually impossible to obtain when numbers of men are congregated in large temporary camps during manœuvres. The question of water supply is an anxious one, not only as regards quality but also as regards quantity. The amount required to carry on the work of the body is not less than two and a half pints as drink, be it in the form of tea, coffee, beer, etc., or plain water.

During marches through a badly watered country this quantity may have to be reduced. For baths, for washing clothes and utensils, and for cooking, although some 12 gallons are allowed in towns, there will be the greatest difficulty during military manœuvres in getting even a fraction of this. Want of cleanliness in time of war is chiefly due to want of water, and clothes may have to be worn for several weeks without being washed. To state, therefore, the amount of water to be provided for each person in large armies is an impossibility. For hospitals in the field, water is an essential, so that every hospital camp or station should be placed as close as possible to the nearest available supply. It may be stated that where less than 5 gallons per day per head of the patients and those attached to a hospital camp is all that is available, the patients are sure to suffer if the supply is not speedily increased or the camp removed to a place where a larger supply can be obtained.

Protection of Water Supply.—Pickets should be placed on both sides of the stream for some distance, when necessary, to prevent cattle on either bank gaining access to the stream, otherwise the water may be fouled and the mud stirred up.

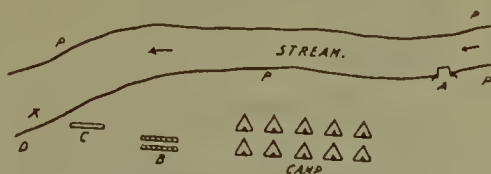


Fig. 76.—Diagram showing arrangements for water supply.

- A, Water for drinking and cooking drawn from a platform, if necessary, so as to reach the water at some distance from the bank.
- B, Ablution troughs at some distance from the bank.
- C, Trough where horses are watered.
- D, Where clothes are washed.
- P.P., Water pickets placed to prevent the stream being fouled by men or animals.
- X, Where river bathing may be allowed.

The drinking water must be drawn from up the stream a short distance above the camp (Fig. 76). Ablution troughs or basins are placed at a little distance from the bank, so that the waste water may not pass directly into the stream. Troughs must be provided for horses, or, where these cannot be had, a channel may be cut leading to a small dug-out hole where the horses may be watered; by this means the mud is not stirred up, and the horses cannot foul the water with excretions.

Raising the Water.—When the camp is large it will save labour and time if the water is raised by a pole and bucket from river or lake. A post is driven into the ground close to the bank, or a young tree-trunk is cut to a convenient height, say 10 feet. A pole, say 15 feet long, is tied so that one-third of its length is towards the land side of the post and the remaining two-thirds projects towards the water. A weight (stone, bricks, etc.) is fastened on the bank end of the pole; a

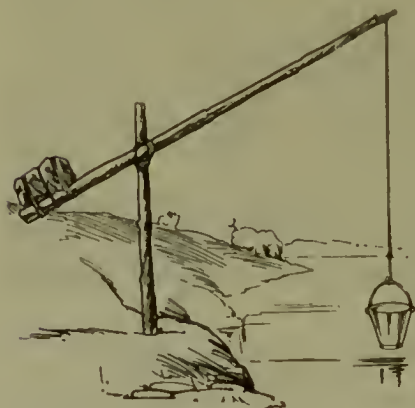


Fig. 77.—A simple method of raising water.

rope bearing a bucket, box, or even a canvas bag is suspended from the other end. The post and pole are tied together in such a manner that there is considerable play allowable. In this fashion, water may be raised from 4 to 12 feet. (Fig. 77.)

Filling Troughs.—When filling troughs for ablution purposes or for horses, it is best to form a number of men into two rows; the buckets are handed from man to man, the full buckets along one side, and the empty buckets along the other.

To Draw Water from a Well when neither a Pump

nor a Chain and Bucket is provided. — One man descends with a foot on either side of the wall of the well until just above the level of the water. A second takes his stand 5 feet higher, or with his feet on a level with the lowest man's shoulders; a third and fourth, if necessary, take their stands 5 feet higher up respectively. The lowest man dips the bucket in the well and hands it up to the man immediately above him and so on until finally the bucket reaches the top, when the water is poured into a trough or into a hollow scooped out of the ground. If the soil is of sand or gravel the water will rapidly sink in the ground; but a piece of sacking, canvas, oilcloth or waterproof will help to retain the water for a time until animals can drink.



Fig. 78.—To prevent splashing and ease the carriage of buckets of water.

Improvising Buckets.—When buckets cannot be had, a piece of oilcloth may be pushed down into a basket or crate, so as to cover the bottom and sides, the water being thereby retained.

To Prevent Splashing.—When carrying water in buckets a hoop, used as in the diagram, serves to ease the burden and to prevent the buckets from knocking against the knees, whereby splashing is prevented (Fig. 78).

When a single bucket is being carried, a piece of clean cloth laid on top of the water, or failing that, a wreath of grass or anything that will float, will serve to prevent splashing.

When Thirst is Severe.—During marches, when water is scarce, thirst can be relieved by chewing a piece of straw or the leaf of a non-poisonous plant, or by keeping in the mouth a smooth pebble, or even a bullet.

When giving water to persons overcome by thirst, allow them only a little at a time; it is best to administer it in sips, or in spoonfuls only.

Water Bottles.—Every ambulance squad should see to it that the water bottle is filled with pure water before going on parade out of doors. If this is not done when practising drill it is apt to be forgotten in times of necessity. Water bottles should be frequently cleaned by having boiling water with a little bicarbonate of soda added poured into the empty bottle, until say one third full, when the stopper is inserted and the bottle well shaken for two minutes. The water is then poured off and the bottle filled with pure water until it reaches the shoulder of the bottle only; if it is filled to the neck the water is apt to escape during marching.

Drinking during a Journey.—When travelling in a jolting vehicle it is often an awkward matter to drink. This difficulty may be overcome by drawing the water through wheat straws, or a small indiarubber tube in the case of men lying down. This will prevent spilling, and serve to avoid the danger likely to arise from taking a long drink of cold water too rapidly if one is very hot.

Washing Clothes.—Soap is always difficult to obtain in military operations, during both peace and

war. In its place bran has been used, and fuller's-earth at times. These, however, are very unlikely to be obtainable when soap is scarce.

If soap is scarce or cannot be had, collect furze, heath, broom, rushes, reeds, or seaweed when near the coast, etc., burn them, collect the ashes, and throw them into the water as it is being boiled; the lye thus formed helps to replace soap. Should none of these substitutes be at hand, all that can be done is to steep the clothing for a few hours in the softest water obtainable, then take the soiled clothes to the waterside, wash and beat them on a flat piece of wood, or lay them on a broad stone and knead and wring them with the hands.



Fig. 79.—A dome of twigs made over a smouldering fire for drying clothes. A device of this kind can also be used to dry clothing that has been soaked by rain during a march.

Bleaching and Drying.—The washed clothes may be laid to dry on hedges or bushes, or spread out on a lawn or meadow pasture, or suspended from lines supported on props. If there is no sunshine, a temporary frame may be made of hurdles, or a number of twigs may be arranged to form a dome-shaped enclosure over a smouldering fire (Fig. 79).

Hard Water.—It must be remembered that the harder the water, the more soap is required to form a lather, and thereby the expense of washing is increased; the softer the water used, the greater the saving in soap and in time. Boiling the water serves to remove hardness, but rain water (that is, soft water as it is called) has no hardness. The hardness of water is caused by the presence in it of chalk, which is held in solution by the presence of carbonic gas in the water.

To get rid of hardness, the commonest plans followed are : (a) Boiling the water. By this means the carbonic gas is driven off and the chalk (carbonate of lime) present in the water falls out of solution, and becomes deposited on the boiler, pots, and pans as a crust ; this hastens the destruction of the metal of the boiler or pan. (b) Adding lime to water of average hardness, in the proportion of 1 oz. to 700 gallons, or approximately $\frac{1}{2}$ grain to each gallon. The lime must be slaked, placed in the bottom of the tank, and the water poured over it. At first the water is milky in appearance, but after twelve hours' standing it becomes clear unless close to the bottom of the tank, and may be poured off and used. Lake water is usually softer than river water.

DISPOSAL OF REFUSE

The avoidance of pollution of the soil in and around a camp or hospital area is of primary importance in the maintenance of health.

Dirty water, and especially greasy water from the kitchen, thrown haphazard about the camp, soon becomes offensive and attracts flies. To obviate this, a shallow pit or trench is dug a few yards away from the kitchen ; if too far off there is temptation, especially in the dark, to throw the dirty water on the ground just outside the kitchen. Across the dug-out pit or trench, branches of brushwood or gorse are placed in a fairly thick layer. The dirty or greasy water, when thrown on this, is partly strained, the fat and grease adhering to the covering, and fairly clean water passing through into the receiving area. The branches are removed daily and used for firewood in the kitchen, and fresh branches laid on in their place.

If no brushwood, etc., is to hand, hurdles may be laid across the pit or trench, and wheat straw, rushes, or heather superimposed to act as a strainer for the greasy water. The covering, whatever it is, should be replaced daily. If the camp is to stand for a short time only, there may be no necessity to drain off the water from the pit or trench, but if the encampment is more permanent the water must be drained off for some distance and allowed to run on to the surface of a field

or into the watercourse below the camp ; or, on the other hand, the drainage from the pit may be run off into soakage pits, which are subsequently filled in with earth.

Vegetable Refuse.—Table leavings, potato peelings, and other vegetable refuse, offal from preparing birds for cooking, feathers, etc., should be burnt to leeward of the camp, some little distance off. When it is not possible to accomplish destruction by burning, the refuse should be buried in pits or trenches well away from the camp.

All papers, bits of string, empty match-boxes, and

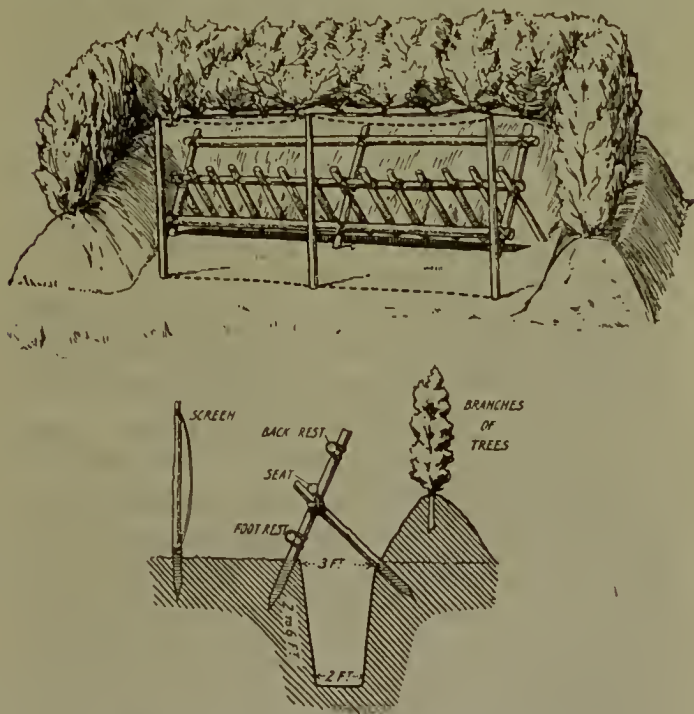


Fig. 80.—Front and section views of camp latrine.
The dotted lines on poles indicate a screen.

the thousand and one things that are wont to be thrown about the camp or left on the floor of the tents should be collected and, if useless, burnt.

Latrines.—The disposal of excreta, both fluid and solid, is an ever-important factor in the management of camp life. (Fig. 80.)

The latrine is a primitive earth-closet meant to prevent, by concentrating the excreta at one spot, the area of the camp from becoming soiled. (a) The latrine should be made almost 100 yards from the nearest tents. If farther off, there is danger of the men, especially on dark nights, and if they are suffering from diarrhoea, stopping short of the latrine and fouling the ground near by the tents. It is well to have pails or empty biscuit tins placed at night near the tents for convenience, thereby preventing the soil from being polluted by urine owing to the distance of the latrine. (b) The latrine should be placed to leeward of the prevailing wind. If the wind changes and persists in the direction, it may be necessary to fill in the original latrine and prepare another. (c) The latrine should be on lower ground than the tents, and so placed that no soakage can take place into the available source of the water supply. (d) Flooding by storm water rushing down from higher ground should be made impossible by the site of the latrine being properly selected, or by a deep trench dug in a crescent form (convexity upwards) higher up the hill above the latrine.

As soon as the site of the camp is chosen, a party must be told off to make a latrine, or local labour may be obtained for this purpose.

On the site chosen a trench is to be dug from 2 to 6 feet (usually 4 feet) deep and 3 feet wide, tapering to 2 feet below; the depth will depend upon the time the camp is likely to remain standing. The earth as it is thrown out is pitched on the side of the trench farther off from the camp. The length of the trench will depend upon the size of the camp. The allowance should be at least sufficient to accommodate at one time 5 per cent. of the persons in the camp, and the space allowed for each "seat" one yard. Thus a battalion of 500 men would require a trench 25 yards long, or two trenches

in this proportion would be more convenient. If the latrine is to be used for more than one or two nights, improvised seats should be provided.

When in use the earth must be thrown in from the bank behind to the depth of 2 inches daily. Some form of oily disinfectant, such as cyllin or izal, should be thrown over the trench and sides daily.

After being used for some time, the trench becomes filled nearly to the top. When within ten inches of the level of the neighbouring ground, the latrine should be no longer used, but the earth filled in and heaped on the top, the arrangements for seats, the screen, etc., being removed for use elsewhere. The turf removed originally should be replaced on the heap; and it is well, if other camps are likely to occupy the same ground subsequently, to affix a label to a stake stating that here a latrine stood. Similarly, when ground has been used for burials, a notice to that effect should be posted before the camp is vacated.

FIRES

1. The most elementary fire-place consists of three stones in a triangle to support a pot; if stones or bricks (Fig. 81) are not procurable, three piles of mud will suffice, or even three stakes of green wood driven into the earth.



Fig. 81.—Fireplace of bricks.

2. A series of recesses may be cut in a bank, one for each fireplace, when the cooking pots may be slung from a pole placed crosswise on the sides of the recess near the top and a fire lit underneath (Fig. 82), or the pots may be supported on stones or clay.

3. A shallow saucer-shaped excavation may be made in the ground from 1 to $1\frac{1}{2}$ feet in diameter. The clay or earth thus raised is kneaded so as to form a 6-inch circular wall, but with an opening some 3 or 4 inches wide at one side. The top of this circular wall should be uneven or raised into peaks here and there, so that when the pot is placed on the top there is room for the

flames and smoke to escape between the wall and the bottom of the pot (Fig. 83).



Fig. 82.—Recesses cut in bank.

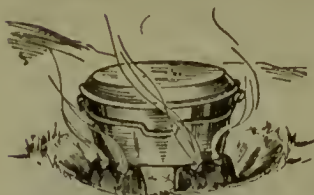


Fig. 83. — Fireplace of baked mud.

from time to time nearer the fire. Over them a tripod stand is made of stakes or iron stanchions, and the pot suspended from the top of the tripod (Fig. 84).

5. A Camp Grate.—This is made by driving two stakes into the ground some 4 feet apart. Logs 5 feet long are next placed to form the back of the grate, then one log on either side and a

4. A Star Fire.—Three logs of wood are placed, as in the spokes of a wheel, with one end in the ashes at the margin of the fire which is burning in the axle of the wheel as it were. The logs require to be pushed

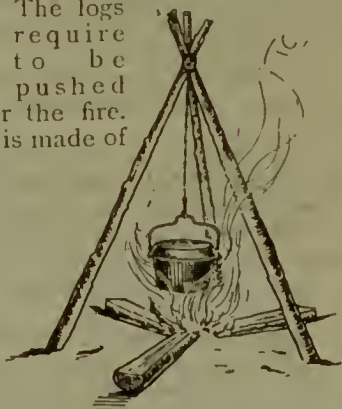


Fig. 84.—Star fire with tripod stand. }

crosspiece for a "fender" are placed on the windward side to enclose a small area on which the fire is to be lighted. (Fig. 85.)

6. A Trench Kitchen.—If the encampment be only for a night or two, one or two trenches, according to the number to cook for, should be dug 7 feet 6 inches long, 9 inches wide, and 18 inches deep at the mouth, and continued for this depth 18 inches into the trench, then sloping upwards to 4 inches at the back, with a splay mouth opening to the wind, and a rough chimney 2 feet high at the opposite end formed with the sods cut off from the top of the trench (Figs. 86, 87). It will be advantageous if these trenches are cut on a gentle slope.

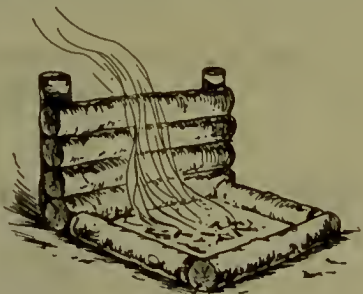


Fig. 85.—A camp grate.

The kettles or pots are placed side by side with their bottoms resting on the ridges of the trench. The spaces between them are packed with wet earth or clay, which should reach about half way up on the pot being cooked. The fuel, generally wood, is fed into the trench from the splay mouth. In the military trench kitchen iron cooking bars are placed across the trench to support the kettles or pots.

7. Broad Arrow Kitchen.—The broad arrow kitchen is a combination of trench kitchens (Fig. 89).

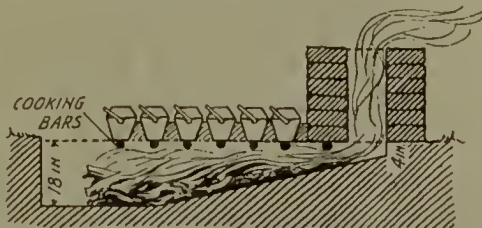


Fig. 86.—Trench kitchen : sectional view.

8. **The Gridiron Kitchen.**—The lateral trenches open into the flue at points not quite opposite each other, so that there may be no conflict of draught. (Figs. 90, 91.)

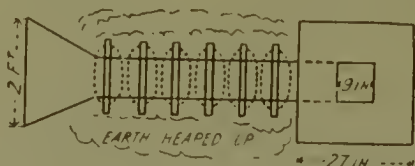


Fig. 87.—Trench kitchen, viewed from above.



Fig. 88.—Metal stand for camp fire, to support kettles, etc.

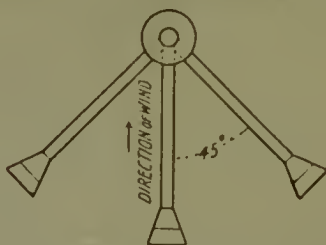


Fig. 89.—Broad arrow kitchen.

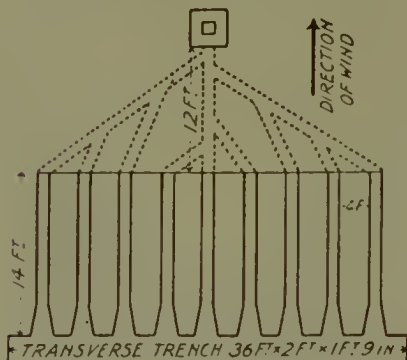


Fig. 90.—Gridiron kitchen on large scale.

9. The Wall Kitchen.—On damp or marshy sites a wall kitchen will be found to answer best, constructed as follows: Cut sods of turf about 18 inches long by 9 inches wide, and lay them in two lines 2 feet 6 inches apart, and 18 inches high, closing up the leeward end with sods. Lay the wood all over the bottom between the two walls. Place sticks or metal rods (iron rail-

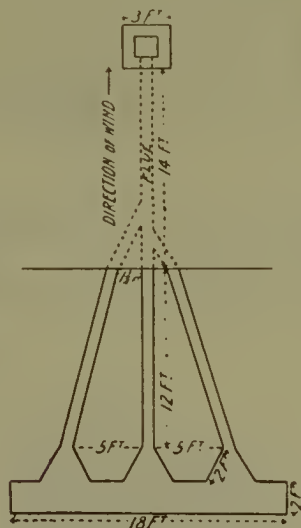


Fig. 91.—Gridiron kitchen on small scale.

ings) through the handles of the kettles and hang them over the centre with the ends of the sticks or rods resting on the walls. Light the fire. (Fig. 92.)

Cooking in the Field, or for temporary hospitals where immediate preparation of food is demanded, or until such time as the trench kitchen or broad arrow kitchen can be prepared, may be accomplished by the cans, tins or pots being piled on each other as in Fig. 93 and the fire being lighted between them. A pot on the leeward end of the channel thus made will prevent the

heat passing beyond the vessels in which the food is being cooked.

Firewood.—In the country dry twigs for lighting fires will be found mostly below bushes and hedges. A dead tree trunk will yield either bits of bark or rotten wood



Fig. 92.—Wall kitchen.

from the hollow in the trunk; its branches are also easily broken off and may be used as logs or chips for fire lighting. There is a knack in finding firewood, but with a little experience it is not difficult to find it here and there in the country.



Fig. 93.—Fireplace between cooking pots without trench.

Fuel to light a fire may be also obtained in one of the following ways: Gather some dry grass, straw, leaves, or moss; if these are unobtainable, get tow (oakum), made by unravelling rope or string; paper that is crumpled up and then cut or torn into fine strips, wood shavings, or fine chips of wood, are generally procurable.

If all else fails, the dry dung of cattle or other animals, found on the ground, may be used ; on being fired, curiously enough, there is nothing objectionable about it.

Small sticks should be made of different sizes if the fire is to light readily ; these sticks should be in quantity, and should vary from the size of a lucifer match and of a lead pencil to the size of a finger and stout stakes. In wet weather dry twigs may be found under hedges, but it is usually necessary to cut little chips from the centre of a log.

To light the fire, put the dried leaves, grass, tow, paper, etc., to form a " nest " ; around and over the nest place the finest chips or pencil-sized pieces of wood, then set light to the central part of the nest, and gradually

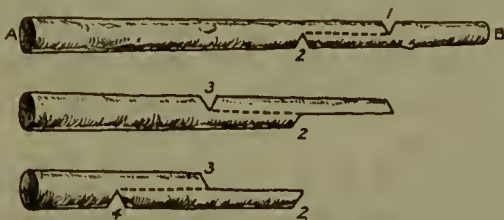


Fig. 94.—To cut up logs.

add the sticks as the nest blazes until quite large pieces are put on. *Men* must remember that small sticks kindle a fire, whilst large ones put it out. Peat makes an excellent fire, and leaves a quantity of hot ashes most useful for cooking.

To cut up Logs.—How logs may be cut up is shown in Fig. 94 and described below.

1 and 2 are two notches cut in opposite sides of the log near one end. Seize the log at the end A, invert, and strike the end B violently against the ground ; the piece will break off between 1 and 2 along the dotted line. Cut another notch at 3, and again strike the log against the ground, and the piece 2-3 along the dotted line will break off. Make another notch at 4, invert, and again strike, and the piece 2-4 will break off along the dotted line.

Fireplaces in Boats.—Daub a thick layer of clay in the bottom of the boat to form the hearth of the fireplace; this will prevent the timber from catching fire. Another plan is to line a wooden box with clay, fill up with sand, and place three or four large stones on the sand to form a hearth.

Fires without Matches.—When matches give out, a “flint and steel” may be used to get fire. If a piece of match paper (brown paper dipped in saltpetre and dried) is held against the piece of flint so that its edge is in line with the upper or the under edge, a spark may be struck by a piece of steel, or an ordinary pocket-knife (closed, of course). Instead of the match paper, tinder may be used, or it is possible to set quite dry, fine grass alight by striking the flint with the steel.

Flints are always to be picked up in any districts where chalk abounds; other stones besides flint will suffice, such as an agate, or a piece of granite. The “steel” may be improvised from a pocket-knife, the iron heel of a boot, or a piece of broken horse shoe of handy shape.

When the sun is shining brightly a light may be obtained by a magnifying glass, by the object glass of a telescope or opera-glass, or even by convex (old sight) spectacle glasses, focused upon the object to be set alight, be it dry shavings or grass.

The glass has to be held so that the sun’s rays focus on a given point for a little time.

CHAPTER XI

TENTS AND SHELTERS

IN Field Ambulances the single circular or bell tent is used for the accommodation of the sick and wounded.

There is no doubt that it is more hygienic and more convenient as regards treatment, feeding, and administration generally to treat the sick in a hospital encampment consisting of tents, than to apportion the cases to public buildings, private houses, etc. The distribution of the injured according to the latter method over a scattered area is inconvenient from every administrative point of view; moreover, the hygienic conditions, the drainage and water supply, etc., of the private houses may be altogether faulty; and discipline, the first item in successful administration of a hospital in any circumstances, becomes lax, and indeed is rendered almost impossible.

Theoretically, therefore, for military purposes a "hospital of tents" is preferable in every way. Voluntary Aid Detachments may, however, find it difficult to obtain tents of any description in the locality in which they are at work, and although improvised tents may serve to accommodate a few of the injured, the majority will have to be quartered in any buildings available. In almost every part of the kingdom, however, cricket pavilions or marquees can be obtained locally if careful inquiry is made.

It is necessary that members of Voluntary Aid Detachments should be trained to pitch a bell tent or marquee, as well as to know how to improvise shelters when the former cannot be had.

TENT PITCHING

A bell tent is officially stated to accommodate fifteen soldiers during war. For hospital purposes, however, five men only can be quartered in a bell tent.

Choice of Site.—To pitch a bell tent, or a series of

bell tents, for hospital purposes, the ground chosen should be dry, and on grass if possible. A steep slope should be avoided, but it is well that the ground should fall away gently to the south, so that the rain may not accumulate as it is apt to do on level ground, and a southerly aspect is advisable for warmth and sunshine. It is well also to avoid a wood with close undergrowth, low-lying damp meadows, and wet clay or newly-turned (ploughed) soil.

Several men may be told off to pitch a tent, but it can be accomplished by two, and if one or two men of a Voluntary Aid Detachment know how to put up a tent, they can direct others what to do to assist them.

When several tents, or a hospital encampment of tents, are being pitched, the ground available must be measured off, the distances between tents decided upon, and the tents placed in rows and in as accurate lines as the ground will permit.

Requirements.—A bell tent, a pole, forty pegs, and a mallet.

Pitching a Single Tent by Two Men.—Drive a peg into the ground to mark the centre point for the tent pole. Take $3\frac{1}{2}$ paces (a pole length) from the centre peg in the direction the tent door is to face, and drive a peg (No. 1 or front peg) into the ground. The tent door should face, as a rule, to leeward of the prevailing wind. In exactly the opposite direction $3\frac{1}{2}$ paces from the centre peg drive in a second peg (No. 2 or rear). At right angles between these, $3\frac{1}{2}$ paces are taken to right and left of the centre peg, and there the right and left (or Nos. 3 and 4) pegs are driven in. The tent will now be shaken out and laid on the ground behind No. 2 (or rear) peg, with the door uppermost and the top of the tent to the rear. The men then seize the second rope from the door, one on either side, and draw the tent on to the ground it is to occupy, and attach the rope they each hold to the No. 1 (or front) peg. Each seizes the fourth rope (on either side) from the rope already fixed to the front peg, and attaches it to the Nos. 3 and 4 (right and left) pegs. The fifth rope of the tent, counting from the side ropes, is now attached to the No. 4 (or rear) peg. The two parts of the pole are put

together, and the smaller end of the pole is passed within the door and fitted into the top of the tent, keeping the bottom of the pole to the front. One of the men then gets inside the tent and raises the pole, keeping the bottom end on the ground. The pole is gradually raised to the erect position until its lower end comes against the centre peg. When this is accomplished it is held there while the man outside tightens the five lines which have been already fixed to the four pegs. The tent will now stand by itself, when both men proceed to drive pegs in a circle (9 feet from the pole, the tent being 18 feet in diameter), each peg corresponding to a tent seam and line. Those to the windward should be first fixed, especially if a strong wind is blowing. The two second ropes from the door are now disengaged from No. 1 (or front) peg, the peg is drawn, and a peg driven in for each in line with the seam. The curtain of the tent is pegged down all round. The door is opened and the ropes attached to its lower corners are fastened to the second peg on the right and left of the doorway.

Peg Driving.—In driving a peg into the ground the notched side should be turned outwards, the peg sloped at half a right angle, the point being directed downwards and inwards towards the centre of the tent, and at this angle (45°) the peg is driven in until within 1 inch from the lower end of the notch. Unless the head of the peg is squarely hit with the mallet there is danger of its splitting. Especially is this the case when an ordinary hammer is used. To prevent the tendency to split, place a piece of wood on and parallel to the upper end of the peg; the blows of the hammer (or stone) falling on the intervening piece of wood are then not so likely to split the peg.

Runners on Ropes.—The ropes of the tent are each provided with wooden "runners," which allow of a loop on the rope; the loop is passed into the notch in the peg, and by passing the runner up and down, the tent ropes are tightened or slackened.

Airing Tents.—When the tent is unoccupied, and in fine weather when the tent is occupied, the curtain should be rolled up to allow of ventilation. Even in

boisterous weather the leeward side of the tent curtain may be rolled up.

Slackening Ropes.—When rain falls after an interval of dry weather, the tent ropes must be slackened, otherwise the pegs are apt to be pulled out of the ground, or the tent may even be pulled completely over.

When the canvas is wet, see that nothing touches the tent on the inside, such as the corner of a bed or stretcher, otherwise the water will leak through the canvas and saturate the bed or other material adjacent. If the inside of a wet tent is even touched by the hand, water will percolate through and the drops will fall inside the tent.

If heavy rain suddenly comes on during the night, it is necessary to get up and go outside and slacken the ropes. The inexperienced man will go out in his shirt or pyjamas, with the result that when he comes in again his garments are soaking, and he has to take them off and go to bed in his bare skin; the old campaigner strips off his sleeping garments before going out into the wet, comes in, dries himself with a towel, puts on the garments which he removed and gets to bed dry.

It must be remembered that even a heavy night dew may necessitate the ropes being slackened.

If the tent has been pitched when the canvas and ropes are wet, the ropes must be *tightened* as the tent and ropes get dry, otherwise neither the canvas nor the ropes are taut.

Trenching a Tent.—If the tent is likely to be required to stand for some time, or if the weather is wet, a trench ought to be made round the tent. If the trench is made whilst pitching the tent in the first instance, it should be dug before the curtain is pegged down. If no trench has been dug and wet weather comes on, the pegs fixing the curtain loops must be pulled up before beginning the trench, and reinserted when the trench has been made.

To dig the trench, insert the spade all round the tent just outside of where the curtain touches the ground; the spade is driven in, in a vertical position, to the depth of 6 inches. At a distance of 6 inches away from the

vertical cut the spade is driven in obliquely to reach the bottom of the vertical 6-inch cut (Fig. 95). The earth thus dug up is laid round the outer edge of the trench; if it is turf that the trench is made in, the grass surface is turned downwards so that when the tent is struck the turf may be readily replaced. When the trench is finished, the curtain is pegged down on the inner (tent) side of the trench.

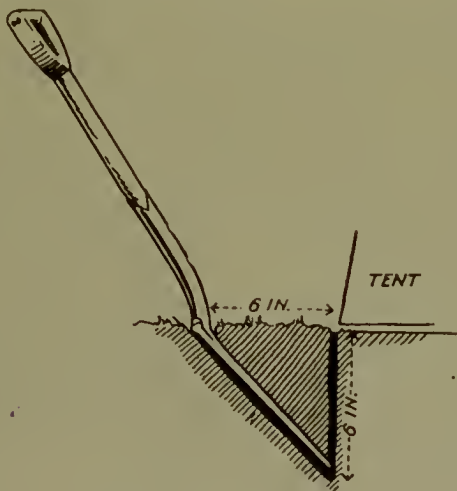


Fig. 95.—Trenching a tent.

Striking a Tent.—Remove the loops from all the pegs except those on the extreme right, left, rear (the Nos. 2, 3 and 4 pegs first inserted), and the two front pegs by the door. One man goes inside and holds the pole whilst the other draws out all the pegs from which the loops of the ropes have been removed. The pole is now unshipped and brought out bottom end first through the tent door. The loops are removed from the remaining pegs and the pegs drawn. The top of the tent is seized, and the tent pulled to the rear, door uppermost. The sides of the tent are now folded inwards so that they meet in a line with the centre of

the door. This process is repeated, and then the right half of the tent is folded over the left; the point is brought half way down the tent front and the canvas tightly rolled from the narrower end towards the base. The whole is then tied in a bundle or put in a bag or valise, if such is to hand. The two pieces of the pole are pulled apart, laid parallel to each other, and tied together.

Mallet and pegs are supplied with the regulation military tents; if these are not to hand they must be improvised. A wooden maul or beetle may be got at a farmhouse, and roughly prepared stakes made to take the place of the regulation pegs.

Tents in Hospital Encampment.—When a series of tents are to be set up they must be pitched at regular intervals. Supposing 8 tents are to be pitched in a row, 8 men will take up position in line (properly covered and dressed) at an interval of 21 feet (or $8\frac{1}{2}$ paces) between each man. This allows 18 feet for the pegs of each tent, and 3 feet distance between the pegs of adjacent tents. Each man, after attaining his proper position, and the line having been dressed, drives in a peg to mark the centre of each tent where the pole is to be placed. The whole then proceed together to pitch their tents (*see* above), and for drill and parade purposes they ought to act together, each step in pitching being made in conformity as to time.

THE MARQUEE (SMALL)

For hospital purposes marquees may be large or small. The large marquee is 35 feet long and 17 feet wide; the smaller measures 29 by 14 feet. Although a cricket pavilion is more likely to be the marquee available for Voluntary Aid Detachments, it is useful to familiarise the members with the pitching, striking, etc., of the regulation marquee.

As the hospital marquee of the smaller dimensions will be the one more likely to be obtainable for practice by Voluntary Aid Detachments, a description of this marquee and of the method of erecting, striking, etc., is given.

Description of Marquee.—A hospital marquee,

inside dimensions 29 feet long and 14 feet wide, weighing 512 lb. complete, consists of—

1 inside linen roof.

1 outside roof.

8 walls (4 inside and 4 outside).

82 bracing lines (40 inside and 42 outside), with wood runner and button to each.

2 wooden vases, painted red.

4 weather lines (2 in one piece) with large runners.

[Packed in a canvas valise, laced up in the centre, and marked on the outside "Hospital Marquee."]

180 small tent pegs.

4 large tent pegs (for weather lines).

2 mallets. [Contained in one "peg bag," marked on the outside with contents and marquee to which it belongs.]

1 set of poles, consisting of 8 pieces, viz. 1 ridge pole in two pieces, and 3 standard or upright poles in two pieces. [Lashed together in one bundle by two box cords.]

1 waterproof bottom, made of painted canvas, in four pieces, each piece measuring 15 feet by 8 feet. [Rolled in a bundle round a thin pole, and tied by three box cords.]

Laying out the Ground for Pitching (Fig. 96).—

Undo and empty the peg bag (keeping the four large pegs for the weather lines by themselves), fit the handles in the mallets, and fix the two pieces of the ridge pole together. This done, proceed to lay out the ground for pitching the marquee as follows: Lay the ridge pole on the ground selected, and drive in a peg at its centre and at each of its two end holes. These pegs will mark the positions of the standard or upright poles, and will be 7 feet apart. With each end peg as centre, in a semi-circle, with a radius of 6 yards, lay 13 pegs with their points inwards where they are to be driven. This will be best done thus: Step 6 yards from one of the end pegs and, in a straight line with the three standard pegs, lay the centre peg of the semi-circle; next step 6 yards to each side of the end peg, and, on a line at right angles to the three standard pegs, lay a peg for each end of the semi-circle; then lay at

each side, between the centre peg of the semi-circle and the two end pegs, equal distances apart, five pegs, and the semi-circle of thirteen pegs is complete. The other end will be done in the same way.

For the sides of the marquee, on a straight line parallel to the three standard pegs, and 5 yards distant, lay six pegs, the first and the last of which will be 18 inches distant from the lines drawn from each end standard peg to the two end pegs of each semi-circle

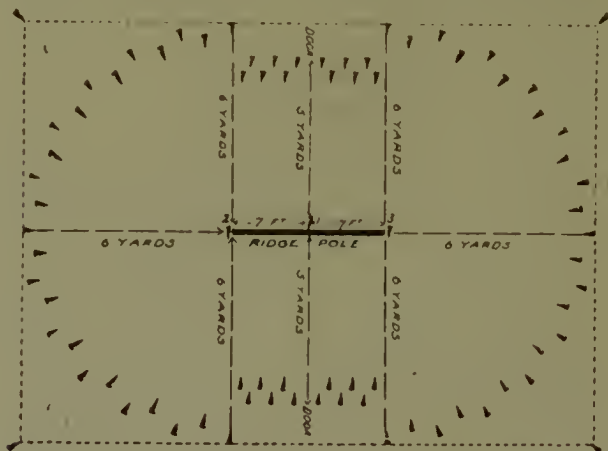


Fig. 96.—Ground plan of the pegs of marquee, and position of weather-line pegs.

Now the pegs for the outer roof are all laid, and should be driven in before proceeding further.

For the inner roof, lay a peg between each two pegs of the outer roof, but on a line 1 foot further in. The space, however, between the third and fourth pegs on each straight line is to be left blank for the doorway. These driven, the pegs are complete for the marquee, except the four weather-line pegs. These are each driven at a corner where two lines would meet to form a right angle if drawn from each end and centre peg of the semi-circle.

Arrangement of Marquee before Raising.—The

ground being laid out, carry the marquee within the line of pegs, unlace the valise, and arrange and spread out the marquee, the roofs one inside the other, in such a manner that the base and ridge will be parallel with the line of the standard pegs and the former touching them. Roll up the upper side of the outer roof as far as the ridge, so as to expose the web slings of the inner roof, insert the ridge pole, and roll up the upper side of the inner roof in a similar manner.

Fix the two pieces of each standard pole together by their numbers. This done, pass them through the openings in the inner roof, and their pins through the holes in the ridge pole, through the eyelet in the two end web slings, and also through the eyelet holes in the ridge of the outer roof. Now fit the vases on the pins of the end standards and pass the opening lincs of the ventilators through the holes in the ridge of the inner roof by the side of the standards. Next pass the lines for opening and shutting the windows through the corresponding eyelets in the inner roof. Unroll the inner and outer roofs to their proper positions, bring the ends of the standard poles so as to prop against the three standard pegs, and square the ridge pole on the three standards thus placed.

Raising the Marquee.—To raise the marquee, ten men and one under-officer will be required. These will be styled four weather-line men, six standard men, and one director. One weather-line man will take up a position at each large peg, holding in his right hand the runner and in his left the line, with a loop ready at any moment to slip on the peg. Two standard men will take up a position at each pole, one at the foot, the other at the top, facing each other. When the under-officer sees all are ready, he will give the word to raise, when all, working together, should steadily erect the standards, taking care not to raise one before the other. The under-officer should now go to the side and dress the standard poles, tightening and slackening the weather lines as required until the poles are perpendicular. He should next go to the end and dress the poles in a similar manner in that direction.

Putting on the Bracing Lines.—The weather line

men should not leave their posts until the bracing lines are on. Four of the standard men should put on the bracing lines, whilst two of them should take mallets and drive in any loose pegs there may be. To put on the bracing lines, two men should go to each side of the marquee, commencing with the outer roof; one should take the line at one side of the window, and the other the line at the other side, and these should be put respectively on the third and fourth pegs of the outer straight line, thus working towards the ends until meeting the men from the other side. In tightening the bracing lines the marquee should be pulled towards the pegs, so as to slacken the line, otherwise the pegs will be pulled out of the ground. The lines of the inner roof should be put on in a similar manner, beginning at each side of the window, and working round to the ends. When two lines are together, they should for the present go on the same pegs, but afterwards be shifted.

Putting on the Curtains.—The curtains are in eight pieces, four for the inner wall and four for the outer wall. The outer curtain should be put on so that the ground flap be inside and that it can be pegged on the outside. The inner curtain should be put on with the flap out, so that it can be pegged on the inside. Commence with the outer curtain at each side of the doorway and work round towards the ends, taking care to leave enough to overlap and close the doorway. When the curtains are on, they should be pegged down both inside and outside.

Striking the Marquee.—Unfasten the curtains at the bottom, and unhook them from the roof, beginning with the inner one. Fold each piece into eight parts. The four weather-line men should now stand by the weather line, while four men unfasten and do up into a skein the bracing lines, beginning with the inner roof at each side of the doorways and working round to the ends. The two mallet men should take up the pegs as the lines are taken off them, and put them away in the peg bag.

Lowering the Marquee.—The men should take up positions as in pitching, one to each weather line and two to each pole. When all are ready, the under-officer

should give the word to lower. The weather-line men should take the lines off the pegs, but keeping a firm hold, and the standard men should have hold of the poles. All together they should steadily lower the poles, the men at the feet of the poles keeping them from slipping, and the other men lowering them by walking backwards towards the ridge, in the same way as men lowering a ladder.

Repacking the Marquee.—Roll up the four weather lines and take the vases off the pins, leaving them there attached by the ventilating cords. Spread out the roofs and roll up the upper flap, so as to expose the ridge pole. Next pull away the standard poles, and remove the ridge pole from the slings.

Folding the Marquee.—Unroll the upper fold of the roof. Bring over each end to the centre, across the middle of the window, and fold the square thus made from side to side into three equal parts. Place the eight pieces of curtain on the roofs lengthwise, overlapping in the centre, and the flaps towards the thick end. Roll up the whole, thus placed, evenly, commencing with the thick end, and taking care not to have the roll too wide or too narrow for the valise.

Putting the Marquee in the Valise.—Spread out the valise, and, pushing one of the side flaps under the marquee, roll it in. Having arranged the flaps, lace them, commencing with the ends.

CRICKET PAVILION OR MARQUEE

In many parishes a pavilion is kept by the Parish Council, even in sparsely populated and essentially rural districts. In the village where it is kept a few people know how to pitch the pavilion and will readily render help.

The pavilion shown in Plate V. is kept in a small rural Hertfordshire parish of 400 inhabitants, and was pitched under the direction of the village carpenter in twenty minutes. It is photographed as being used for an operation tent. The curtain is opened at the side for the purposes of photography, but the curtain can be opened at either end, as in the regulation operation tent.

Apparatus.—The apparatus required are:—

1. Two upright poles and sixteen curtain poles.
2. A cross-beam to form roof.
3. Canvas roof.
4. Canvas curtain with eyes to hook round curtain roof.
5. Six large and sixteen smaller pegs.
6. Six main or guy ropes with runners and sixteen smaller ropes with runners.
7. Caps or pole tops, two large for either end of roof cross beam to which the guy ropes are attached, and sixteen smaller caps for curtain-pole tops.

Pitching the Pavilion.—Lay the cross-beam for the roof on the ground; at right angles to the ends of the cross-beam roof lay the poles parallel to each other, the pole-end with metal peg next the roof beam; insert the metal pegs in the holes at either end of the cross-beam.

At the lower (rounded) end of each pole as it lies on the ground a peg is driven into the ground, the flat side of the peg towards the pole-end; and at either side of each pole-end pegs are driven in, the flat side of pegs towards the poles. These prevent the pole-ends from slipping.

The roof canvas is laid on the ground on the side of the cross-beam away from the poles; the roof canvas is now pulled on to the poles, the roof beam with the ends of the poles attached being raised to allow the under-surface of the roof canvas to be pulled underneath. When the canvas is pulled completely over the poles, the metal pegs on upright poles are pushed through the holes at either end of the canvas roof. The roof pole caps are now fitted on to the metal pegs with the guy ropes attached. Six men hold the guy ropes, one at either end of the pavilion and one opposite each pole. The top of the pavilion is next raised from the ground whilst the men with the guy ropes on the "rising" side of the pavilion pull the poles and roof canvas into the upright position. Whilst it is being held in this position the six large pegs are driven into the ground firmly and the guy ropes are slipped over them and the runner secured so that the pavilion is maintained securely



Fig. 1.—Cricket pavilion as operating tent.

The operating table is an ironing board supported on wooden boxes. The side table consists of an ironing board and trestles.



Fig. 2.—The operation proceeding.

The ropes on the windward side are first secured. The curtain poles are now placed in position, the metal peg is inserted into the holes at the edge of the curtain roof, the small caps with ropes attached are placed on the pole pegs. Sixteen pegs are driven in the ground around the pavilion opposite the poles and the loops of ropes are slipped over them and the runners secured in place. The curtain is now hooked on the canvas roof, a door or doors being left at any convenient place.

Striking the Pavillon.—First the curtain is removed, the small ropes are unhooked from the small pegs, the caps removed, and then the curtain poles. Pegs are driven in round the foot of the main poles (if these have been withdrawn) as when pitching. Six men unship the loops of the guy ropes from the large pegs and hold the ropes firmly. The men holding the guy ropes on the windward side now gradually slacken their ropes and the roof is slowly let down until it comes within reach, when a man at either end helps to lower it to the ground. The whole is then taken apart and packed.

OPERATING TENT

Although in Voluntary Aid Detachment work a regulation operating tent will seldom be available, it is well to know the official requirements of a tent where operations are to be conducted and to practise pitching it when a tent of this kind can be obtained.

The tent is rectangular in shape, and has a doorway at each end. It is fitted with six ventilators of the ordinary type, and also with a large ventilator on each side to give extra light and air. The wall is permanently attached to the tent.

The poles used with it consist of two upright poles and one ridge pole, each made in two pieces.

	ft.	in.		ft.	in.
Length . . .	20	0	Height . . .	9	4
Width . . .	14	0	Height of wall .	3	0

Weight of tent (about) 116 lb., or *with poles* and appurtenances complete (about) 181 lb.

The complement is—two mallets, one pin bag, sixty

small pins, and eight large pins; this allows two spare small pins.

Note.—On account of the rods in the large ventilators, this tent must be folded and rolled up lengthwise, and the weather lines must not cross the ventilators when the tent is pitched.

Drill for Pitching Operating Tent.—The numbers required are one under-officer and six men—two as pole men, four as tent men. The pole men take the ridge-pole and uprights, the tent men take pegs and mallets (a maul or beetle is required to drive large pegs).

The tent men unpack the tent and spread it on the ground flat, the lower edge about two paces from the ridge-pole, and the top to windward.

The pole men put the ridge-pole together and lay it on the ground on the intended site of the tent, and a peg is driven into the ground at each end of it. They stand back to back with these pegs between their feet.

Two of the tent men take post at the pegs, their backs to the faces of the two pole men, and take five paces to their front, dress themselves on pole men, and turn to windward, i.e. towards the canvas as it lies on the ground. Two other tent men join them, and stand back to back with them, and the four now take six paces to their front and halt.

The pole men take a maul and four large pegs and drive them at points marked by the feet of the tent men.

The four tent men return to the pegs marking the ends of the ridge-pole, and after taking two paces in continuation of the line marked by it, turn back to back at right angles to the line, take six paces to front and halt. Four large pegs are driven at their feet by the pole men for weather-lines; the pole men return to the poles, and lay the frame with the feet of the uprights against the pegs first driven, ridge to windward.

The tent men roll up the upper side of the tent until the top is exposed, and, the pole men raising the poles, the underside of the tent is drawn beneath them, and the poles are adjusted, care being taken that each ventilating cord is on its own side of the ridge hole. The vases with weather lines are now fitted on, the lines

uneoiled, and the four tent men, taking one each, move towards the weather-line pegs. The pole men working with them, the tent is raised, and the lines are fastened to the pegs. The lines must not be crossed. The four tent men each take an upper corner rope (distinguished by its being fastened to a ring through which another line passes) and adjust it to the large pegs first driven in.

The doors are now laced and hooked.

The tent men take the four lower corner ropes and fasten them to the small pegs driven in a line with, but two paces nearer the tent than, the upper corner pegs. The pole men adjust the windows, the tent men drive pegs and adjust the front and side lines of the roof, drawing them square with the tent, and fasten down the curtain.

Striking the Tent.—The pole men pull up the curtain pegs and let down the windows. The tent men cast off all ends and side lines and coil them, and draw pegs; then take the post at the lower corner pegs.

The pole men stand to the poles, the tent men cast off first the lower corner, then the upper corner ropes and coil down; stand to the weather-line pegs, cast off and hold in hand, then, working with the pole men, lower the tent to windward, coil the weather-lines, and remove the vases.

The pole men withdraw the poles and lash them together.

The tent men fold up the tent as follows:—

The under side is first spread out flat, and the upper side drawn over it; the ends are folded over so as to form a square; the lower end of the square is folded over the middle; the top end is folded over towards the middle as far as the ventilator irons allow and re-folded over the lower half; the whole is rolled from end to end and placed in a valise.

When tents are pitched in a field, it is necessary to measure the dimensions of the field to ascertain how many tents may be accommodated.

The rule is: Add one (distance between tents) to length and breadth in yards, divide each by 6 plus the number of yards between the tents, and multiply. Thus, if a field measures 48 yards long by 20 yards wide, the

tents to be 1 yard apart from peg to peg, how many tents will the field accommodate? The answer is

$$\frac{48 + 1}{6 + 1} \times \frac{20 + 1}{6 + 1} = \frac{7}{1} \times \frac{3}{1} = 21 \text{ tents,}$$

that is, 3 rows of tents, 7 in each row.

IMPROVISING TENTS AND SHELTER FOR SICK AND WOUNDED

Head Shelter of Straw.—Requirements, six sticks and straw. Two of the sticks, say 3 (or more) feet long, are placed upright in the ground, 4 (or more) feet

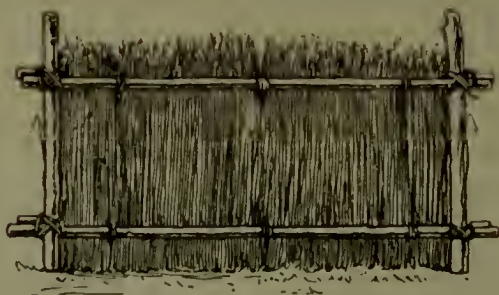


Fig. 97. — Head shelter of straw in frame of sticks.

apart. Two sticks, $4\frac{1}{2}$ feet long, are laid parallel to each other on the ground 2 feet apart. On these the wheat straw, 3 feet long, is laid transversely across the two sticks.

The straw will then reach 6 inches beyond the sticks, above and below. The straw should be at least 3 inches thick. On the straw the two remaining sticks are placed parallel to and over the sticks already placed. The sticks above and below the straw are now fastened together by twine, string, or pieces of straw or hempen rope. The frame thus made (Fig. 97) will serve, when raised and placed between and tied to the two upright sticks to windward of the patient, as a head shelter.

When longer pieces of stick are obtainable, two or more patients may be sheltered by the same straw frame.



Fig. 1.—A blanket tent.

The cooking pot is suspended from a tripod consisting of three metal props.
Pump close by.



Fig. 2.—Side of improvised tent raised to show stretcher supported on bricks.

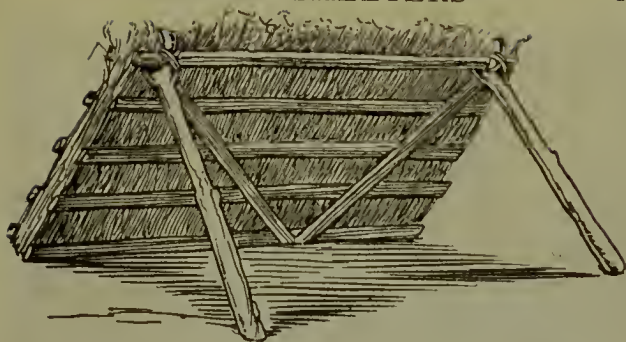


Fig. 98.—Lean-to hurdle-and-straw head shelter.

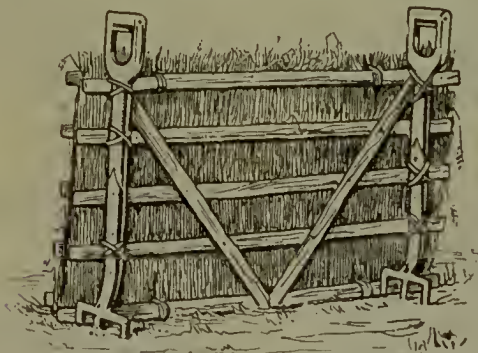


Fig. 99.—Forks and hurdles, with straw between the hurdles, for head shelter.



Fig. 100.—“Beds” of hay or straw laid to leeward of hedge.

Lean-to Hurdle-and-Straw Head Shelter.—Requirements: two fairly thick pieces of stick, 4 (or more) feet long, two hurdles, a bundle of hay or straw.

The sticks are driven obliquely into the ground, one at either end of the intended shelter, and the width of a hurdle apart. The hay or straw is now laid on a hurdle and the second hurdle laid upon the hay or straw to keep it in place. The hurdles are laid so that the top bar of the inner hurdle and the poles cross, when they are tied together (Fig. 98). Beneath this shelter two men could sit with backs to shelter, or lie down with heads underneath the shelter, or one man could spread



Fig. 101.—Stone or brick wall with window blinds or blankets as protection from sun or rain.

his waterproof sheeting parallel with the length of the hurdle and lie down on it, or a stretcher could be placed in the same manner.

If a field has been chosen for the site of a Clearing Hospital, the tents, or more complete shelter, should be given to the more seriously wounded, whilst those more slightly injured will have to put up with whatever shade or shelter they can get.

The hedge or stone fence round the field will afford some shelter from the wind when the patients are placed to leeward close to it. (Fig. 100.)

Shelter may also be provided with the devices shown in Figs. 101, 102, 103 and 104, and in Plates VI. and VII



Fig. 1.—Human ladder for fixing frame of improvised tent.



Fig. 2.—Improvised tent.

At one end a couple of Dutch hoes are fixed in the ground ; at the other end a fork and rake. The improvised stretcher is raised from the damp ground on bricks.



Fig. 102.—Tent with gables of Dutch hoes and rakes.

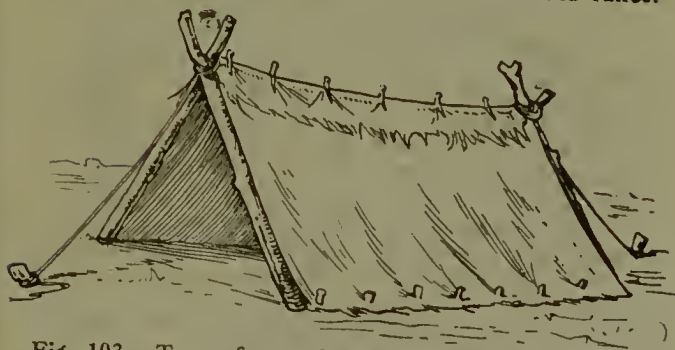


Fig. 103.—Tent of two sheets or blankets secured at ridge by clothes pegs.

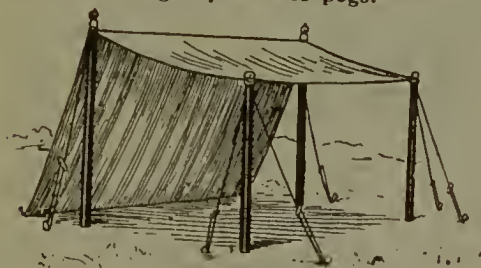


Fig. 104.—Poles of cricket net with covering arranged as shelter.

CHAPTER XII

PREPARING BEDS AND BEDDING FOR RECEPTION OF THE WOUNDED AND SICK

BEDDING MATERIALS

IN a village the number of bedsteads, mattresses, blankets, etc., will be very limited, perhaps a dozen or two at most. Improvised beds, mattresses, etc., must then be provided, and the chief materials from which beds may be extemporised will be hay, and oat, barley, or wheat straw.

Hay.—This may be found (1) lying cut in rows in the fields; (2) gathered together in small heaps (or coles) in the field; (3) in stacks, when it is so tightly packed that it has to be cut into sections by a broad-bladed knife. The hay may be laid down for a bed in sections, or the bundles may be teased out, in doing which a quantity of “dust” will be got rid of. For a fractured lower limb it is best to leave the hay unteased, as a firmer and more level bed is obtained. In the haystack a large hay-knife will usually be found, with its blade driven into the stack and with only the handle protruding; if no knife can be found, the haystack must be mounted, the thatch of straw removed, and the hay thrown off by a pitchfork from the top.

Hay in Sacks.—With a couple of sacks a good bed may be made by stuffing the hay into the sacks until they are fairly well distended. The bottom of sack A (Fig. 105), being received into mouth of sack B, prevents a gap occurring beneath the hips as the patient lies on the “bed.” The sacks should not be too full.

Pillows.—If a greatcoat, coat, jacket or knapsack is not available for a pillow, hay or straw can be made into a bundle 6 inches thick and 2 feet wide. The bundle can be whipped round with the hay or straw from either end of the pillow with a little practice, or the bundle can be held together by twine or two hand-

kerchiefs, or a couple of trouser braces or pieces of linen, a few inches from each end, so as to leave a smooth part in the centre for the head (Fig. 106).

When a ground sheet, waterproof, sacking, or canvas

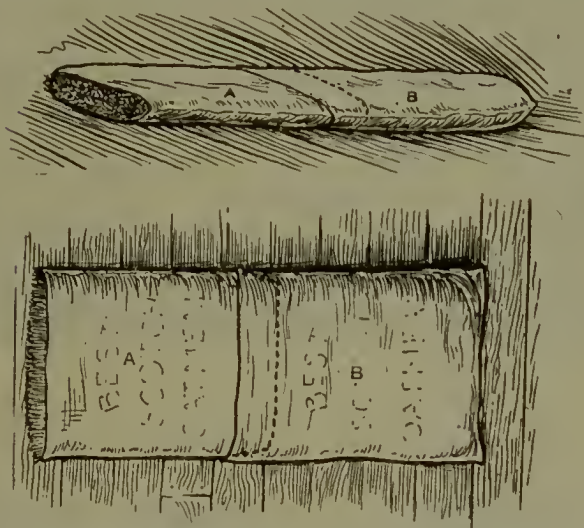


Fig. 105.—Sack filled with hay (seen from above).
Front and side view.



Fig. 106.—Straw for pillow bound at each end.

is available and the floor of the building is earthen, the ground may first be covered with the sacking or canvas before superimposing the hay, straw, heather, etc., or the bedding may be covered with the canvas or sacking and tucked in at the sides, after the manner of an undersheet.

Straw.—Wheat straw is better than either oat or barley straw for bedding, as the straw is longer, and can be arranged lengthwise in a thick layer. Loose oat or barley straw, when other covering cannot be had, is more comfortable than a "blanket" (covering) of wheat straw.

Heather.—In regions where heather is obtainable, as in the Aldershot district, in the north of England, in Ireland, Wales, and Scotland, the sprigs should be cut close to the root, and the heather laid as in thatching a roof; commencing at the foot of the bed, the sprigs are laid with the bloom towards the foot and the stalks sloped towards the head.

Rushes.—Freshly cut rushes, if obtainable, make a good bedding. Commence at the foot of the bed and lay the rushes in overlapping rows.

Leaves.—Sacks not too tightly packed with dried leaves will answer as bedding. If no sacks are obtainable, the leaves must be raked into heaps, and gathered together for a bed.

Ferns.—In the autumn, if dried ferns are obtainable in sufficient quantity, an excellent bed can be made by laying the ferns as in thatching, commencing at the foot of the bed.

MAKING UP THE BEDS

Stack Hay.—If cut from a stack by a hay cutter sections 3 to 4 feet long, 4 inches thick, and $2\frac{1}{2}$ to 3 feet wide, should be made. Two of these will be required to form one bed. A 6-feet-long section, although



Fig. 107.—Four posts with poles for sides, and cross bars top and bottom.

readily cut and theoretically making the better bed, is difficult to carry from the stack to the "hospital" without breaking.

Loose Hay.—If the hay is gathered loose as from the field or hayloft, a layer 6 to 8 inches deep must be



Fig. 1.—Straw beds in a barn.

The straw is held together with strips of canvas or straw ropes.



Fig. 2. Making a straw rope.

The straw is twined with a bent stick, the point of which is tied with string to the shaft just below the man's hand.

laid on the ground evenly and packed with the hands or by trampling upon it. (If the boots are not clean, take



Fig. 108.—Four pegs for posts, a straw rope passed round the posts and completely encircling the area for hay, straw, rushes or heather.

them off before treading the bed.) Stack hay, spread out loosely, must be well shaken to get rid of the “dust” before being laid out for bedding.



Fig. 109. — A, B, two sheaves of straw; C, sheaf ends driven into each other; T, twine round sheaves; Pillow tied with twine at 1 and 2.

The hay, after being laid down, may be covered with saeking, a waterproof sheet, a blanket, or plaid, etc., if such are at hand. If not, the hay may be held in place by two pieces of twine, bandages, or strips of sheeting tied round the hay, one piece passing round $1\frac{1}{2}$ feet above, and the other $1\frac{1}{2}$ feet below, the middle of the hay bed.

A “*Four Poster*.”—To make a “bedstead” on the earthen floor of a barn or cottage, aeroplane shed, or out of doors, drive in four pegs to form the “posts” or corners. Place the pegs so that the bed is 6 feet or more long and $2\frac{1}{2}$ to 3 feet wide. Two poles $6\frac{1}{2}$ to 7 feet long are laid inside the pegs to form the sides; two cross-bars 3 feet wide are laid at the head and foot of the bed, inside the poles. If twine or rope is available the poles may be tied together at the corners, or, failing this, a rope of straw or hay may be twisted to form a lashing. The hay, straw, heather, fern, etc., is then laid down to form the bedding (Fig. 107). Should side and end poles

not be obtainable, a straw rope or hempen rope can be passed round the posts (Fig. 108).

Straw.—Wheat straw may be made up into "sheaves" 3 or feet 4 long, and two sheaves placed end to end to make a bed 6 to 7 feet long. The sheaves must be "buted" (impacted) into each other where they meet. They should be at least 2½ feet wide and



Fig. 110.—Stretcher supported on handles of spades as bed-posts.



Fig. 111.—Stretcher supported on branching pieces of wood as bed-posts.

6 to 8 inches thick. The straw, if in stacks, may be cut into sections, as in the case of hay from the stack. The sheaves may be tied round with pieces of twine, or strips of bandage or linen, or pieces of straw rope. (Fig. 109, and Plate VIII.)

Stretchers as Beds.—It is easy to convert stretchers into beds by the contrivances illustrated in Figs. 110 and 111.

CHAPTER XIII

SURGICAL TERMS—MEDICINAL WEIGHTS AND MEASURES, ETC.

IN the British Red Cross Society's Manuals on First Aid and Nursing most of the points considered in this and the following four chapters will be found treated in detail. First aid work and the elements of nursing having been acquired by members of the Voluntary Aid Detachments, it will only be necessary to supplement such knowledge by some details of work during life in camp and in the field.

TERMS IN COMMON USE IN SURGERY

Septic.—The word septic, so frequently used in surgery, is best expressed in a popular sense by the word *putrid*. A septic wound is one in which putrefactive changes (sepsis) have taken place.

Aseptic means *not putrid*—the opposite of septic—therefore clean, sterile or germ-free. An aseptic wound is a clean or sterile wound; one in which putrefactive organisms are either not present, or present in such small numbers as to be harmless.

Antiseptics.—Substances which are directed against putridity are termed antiseptics. They are antagonistic to the micro-organisms (germs) by which putrefaction is produced.

Disinfectant originally meant a substance which acts on the infective germs that cause communicable diseases, in such a way as to prevent their spread. The word is, however, now used in much the same sense as antiseptic. The better known antiseptics are carbolic acid; mercury in the form of corrosive sublimate (bichloride of mercury); boric acid (boracic acid); chloride of zinc; chlorine; alcohol.

Deodorant.—A substance which merely covers or overcomes offensive odours, but without, as a rule, arresting the putrefactive changes from which they arise, is a pure deodorant. Musk, eau-de-cologne, and other

toilet perfumes are examples of these. A deodorant may be also an antiseptic.

Septicæmia literally means septic or putrid material in the blood; in other words, blood poisoning. When putrefaction occurs in a wound, there is an active development of bacteria. The bacteria, or the virus, poison, or toxin they produce, set up blood poisoning, characterised by rigors (shivering), feverishness, increased temperature, rapid pulse, some delirium, and frequently sweating, vomiting, and diarrhœa. *Septicæmia* is very dangerous, and often fatal.

Pus is the "matter" that is discharged from an abscess or from an ulcer or sore. When examined by a microscope it is seen to consist of small bodies, termed pus corpuscles, floating in fluid. These corpuscles resemble the white corpuscles of the blood, and are derived from them. Pus from an abscess contains multitudes of microbes.

An *abscess* is a collection of pus or matter, the result of inflammation.

Pyæmia literally means pus in the blood, but the elements of pus are not actually present. *Pyæmia* causes symptoms similar to those met with in *septicæmia*, and the two terms are often used to express the same thing—namely, blood poisoning.

Sterile means absence of living germs; and the process of rendering things sterile is called *sterilisation*. A *steriliser* is the apparatus in which substances are rendered sterile. Boiling is the most widely used process by which instruments, clothes, dressings, are rendered sterile or clean.

Germs are microscopic living bodies, known by various names—micro-organisms, microbes, bacteria, etc.

Bacteria are named according to their shape, the most familiar being bacilli, a name given to rod-shaped bacteria, but several other shapes are met with—round (cocci), spiral or corkscrew-shaped (spirilla), etc.

The bacteria which produce disease are termed *pathogenic*, a word which means disease producing. It is these pathogenic bacteria which disinfection aims at destroying. *Germicides* are substances which destroy germs or bacteria.

WEIGHTS AND MEASURES,
Etc.

Drugs are dispensed by apothecaries' weight. By this weight one ounce contains 480 grains. In avoirdupois, there are $437\frac{1}{2}$ grains in an ounce.

The terms used in fluid measurements are, technically, minims, drachms, fluid ounces, pints (imperial) and gallons.

Note.—The terms drop, teaspoonful, dessertspoonful, and table-spoonful, in common use, do not represent exact measurements. A drop of castor oil, of spirit, of water, are of very different bulks; and most of the spoons in table use hold much larger amounts than the quantities they are supposed to represent. Hence it is that in directions for taking medicine the word “measured” is introduced: thus a “measured teaspoonful,” meaning a teaspoonful which holds a standard quantity used for medical purposes, is either written or understood when dealing with quantities of medicine. A minim measure-glass must be used.

Preparing solutions of various strengths.—When making solutions of substances for use as disinfectants, etc., the strengths to be used are given in percentages or in proportionate quantities. The instruction may be given to "make a 5 per cent. solution of, say, carbolic acid." This means that 5 parts in every hundred parts of the solution consist of pure carbolic acid, and the remaining 95

Medicinal Measures

1 minim	= a measured drop			
60 minims	= 1 drachm	= 1 teaspoonful		
120 "	= 2 drachms	= 2 teaspoonfuls	= 1 dessertspoonful	
240 "	= 4 "	"	= 2 dessertspoonfuls	= 1 tablespoonful = $\frac{1}{2}$ oz.
480 "	= 8 "	"	= 4 "	= 2 tablespoonfuls = 1 oz.
				20 oz. = 1 pint
				8 pints = 1 gall.

parts are of water. Another method of expressing the strength of the solution is written thus: 1 in 20, usually written 1-20; meaning that in every 20 parts of the solution 1 part is carbolic acid and the remaining 19 water. The quantities, if proportionate, may be in drops, ounces, pints, quarts, or gallons; thus, in a 1-20 solution, 1 drop, ounce, pint, quart or gallon of pure carbolic acid is added to 19 drops, ounces, etc., of water. To make a pint, therefore, of 1-20, 1 ounce of pure carbolic acid is added to 19 ounces of water, and so with corresponding amounts in each case. If expressed in percentages of 5 per cent., it is plain that when 1 and 20 are multiplied by 5 the result stands at 5 and 100; in other words 5 per cent. For convenience in preparation, the following quantities may be taken as approximately (practically) correct:—

5 minims to 1 fluid ounce make a 1 per cent. solution.

96 minims to a pint make a 1 per cent. solution.

1½ fluid ounces to 1 gallon make a 1 per cent. solution.

To ascertain the capacity of a cistern, can, or any cubical vessel.—Take the length, breadth, and depth of the vessel, and multiply them together; the result gives the capacity in cubic feet (or cubic inches, according to the size of vessel measured). Thus, with a biscuit-tin measuring 9½ inches deep, 9 inches in length, and 8 inches in breadth, by multiplying $9\frac{1}{2} \times 9 \times 8$ we get 666 cubic inches as the capacity of the tin. Now a vessel measuring 1 cubic foot (1728 cubic inches) contains 6½ gallons. Starting, therefore, with the knowledge that 1 gallon occupies (approximately) 266 cubic inches, the quantity of water in a cubical vessel can be readily calculated. Supposing a cistern is partly full, and it is wished to ascertain the quantity of water contained in it: take the length and the breadth of the cistern, and the depth of the water; by multiplying these together, the result in cubic inches shows the bulk of water; and since a gallon occupies approximately 266 cubic inches, it is easy to gauge fairly exactly the amount of water present.

CHAPTER XIV

KNOT-TYING—BANDAGES AND DRESSINGS, ETC.

KNOT-TYING

1. **The Granny** (Fig. 112).—This is the knot ordinarily tied. It should never be used in ambulance work, as it is apt to slip. When completed, it will be seen that the ends lie at right angles to the course of the bandage or loop.

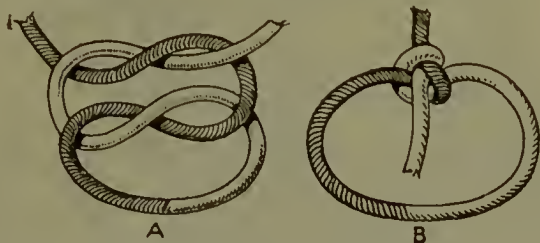


Fig. 112.—Granny knot.

A, Loosely arranged to show how the ends are disposed.

B, Tightened, showing ends at right-angle to loop.

2. **Reef Knot** (Fig. 113).—When this knot is completed, the ends lie parallel to the bandage or loop. This knot will not slip.



Fig. 113.—Reef knot. A, made ; B, tightened.

3. **Clove Hitch** (Fig. 114).—A secure and non-slipping knot. To practise making the knot, lay a piece of string or bandage on a table, make two loops as at A, pass the last made loop beneath the first as at B. The loops are then passed over the wrist, foot, or any part of a limb, and the ends pulled upon. When made on the poles of a stretcher the knot appears as at Fig. 33, p. 52.

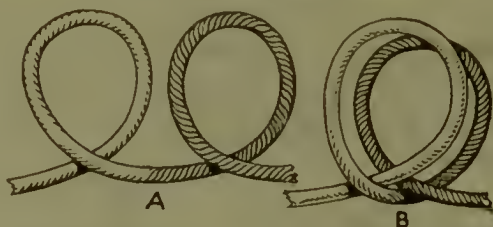


Fig. 114.—Clove hitch in making rope stretcher. A, commenced; B, completed.

4. **Sheet Bend for tying Two Rope Ends together** (Fig. 115). 1, *Single sheet bend*.—Make a loop of one rope end (dark in diagram). Carry the end of the other rope (light in diagram) through and round the dark loop, then under its own strand, emerging over the dark loop on the other side from the strand.

2, *Double sheet bend*.—The light rope end is carried twice round the dark loop.

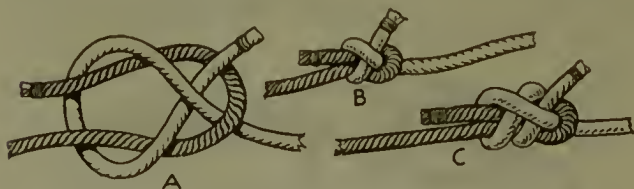


Fig. 115.—A and B, Single sheet bend, loose and tightened. C, Double sheet bend.

5. **Half Hitch and Double Hitch** (Fig. 116).—This knot is used for securing a rope end.

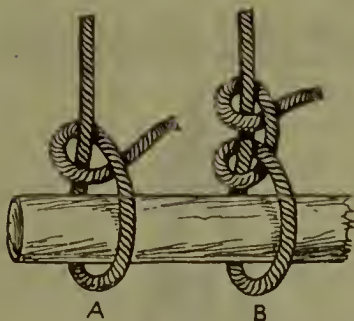


Fig. 116.—A, Half hitch. B, Double hitch.

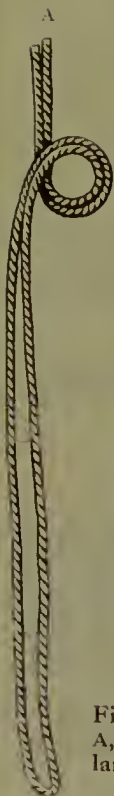


Fig. 117.—Bowline bight. A, the small loop; B, the large loop; C, the completed bight.

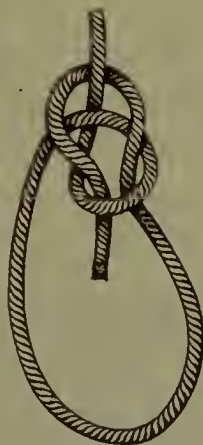


Fig. 118.—Bowline.

6. **The Bowline** (Fig. 118).—This is a useful knot to secure a rope tied round a person's body whilst being lowered from a height, as from a building, ship's side, etc.

7. **The Bowline Bight** (Figs. 117, 119) makes an excellent seat for a person being lowered from a height.



Fig. 119.—Bowline bight with seat.

Double the rope and make a small loop some 8 feet above the end of the rope where it is doubled. Holding the loop thus formed, bring the doubled end through the small loop from behind forwards. The strand of the rope is now passed through the doubled end of the rope as it emerges through the small loop and pulled tightly.

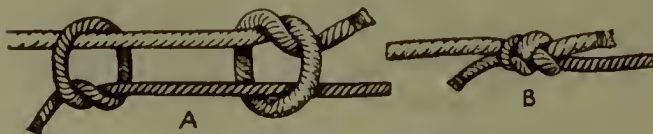


Fig. 120.—Fisherman's knot. A, made ;
B, tightened.

8. **The Fisherman's Knot** (Fig. 120).—Ropes of different sizes may be tied together by this knot. The

thick rope (light in the diagram) has a half knot made at one end, leaving a loop. Through the loop the end of the smaller rope (dark) is passed and a half knot and loop made round the large (light) strand. The strands are then pulled upon, when the knot tightens. The knot is readily undone by pulling the knots apart.

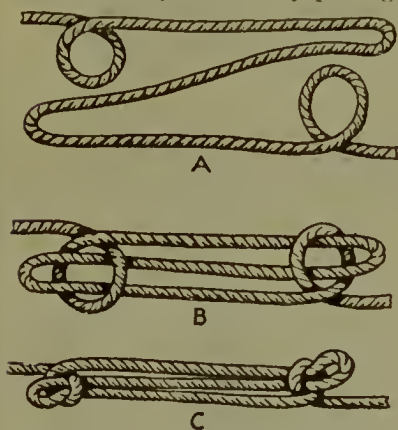


Fig. 121.—Sheepshank knot.

9. Sheepshank Knot.—By this knot a rope can be shortened to required length. In A (Fig. 121) the rope is bent for shortening with loops, making half hitches. In B the loops are applied over the bent ends after twisting each loop outwards on itself. In C the knot is pulled taut.

10. Catspaw Knot.—The catspaw is made in the

middle of a rope, and is useful in fixing a rope with a weight at the end of it to a hook, or two hooks, on a block. The stages of the process are shown in Fig. 122. Through the loop of the rope pass the hands with the thumbs upwards and palms towards each other; separate the hands about 18 inches. Turn both hands inwards so that the thumbs are downwards and the palms facing outwards, seize the rope between the thumb and forefinger of each hand, twist the hands towards the body, and bring them back to the original position. Twist both loops round and round five or six times; thus two loops are formed.

11. Butt Loop (Fig. 123).—In a case of fractured thigh, a splint (a rifle, musket, broom, pole, or long flat splint) has to be applied along the injured side from the armpit to the leg and the foot. To get extension on a splint of the kind is a necessity, in order to keep the

broken ends of the fractured thigh from overriding each other. As a means to this end a butt loop over the upper end of the splint is of great advantage. The loop is made as follows (taking a rifle splint as an example): First remove the bolt from the rifle and see that the magazine is empty. Keep the rifle vertical with butt

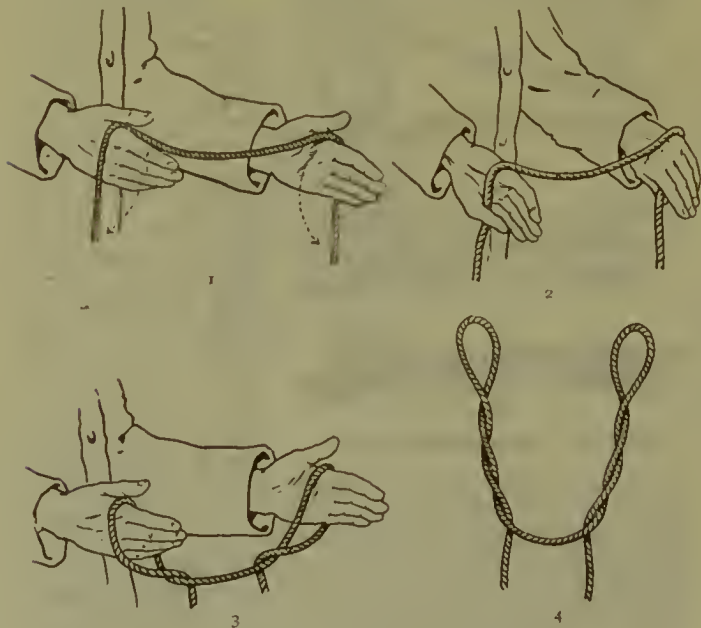


Fig. 122.—The catspaw knot.

end uppermost; lay a narrow fold bandage (or scarf) on the end of butt, so that one-third is on one side and two-thirds are on the other. The long end should fall on the side of the rifle which is away from the body when the splint is applied. Carry the long end round the butt and over the short end, as in diagram, and form a half-hitch by passing the long end between the rifle and the bandage. The ends are then tied, and a loop formed, the knot being on the back of the rifle.

With the rifle and butt loop so prepared, apply the splint to the injured side (Fig. 124); the muzzle of the rifle reaching 2 inches beyond the foot. Fix a bandage round foot and ankle and the barrel of the rifle, taking a turn

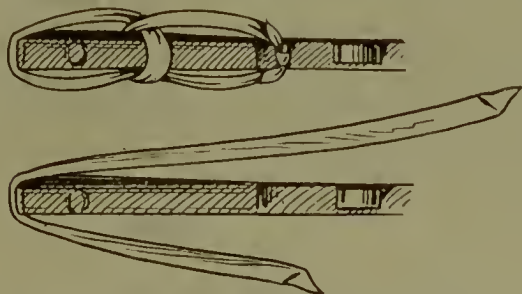


Fig. 123.—Butt loop made as for left side.

of the bandage round the barrel for better security. A bandage (a narrow-fold triangular bandage, or a roller bandage doubled) is passed to the inner side of the thigh right up to the perineum—that is, where the inner side of the thigh joins the body. One end of the bandage is carried over the front of the body, the other round the back of the hip; the ends are passed through the loop of the butt loop; extension is made so that the limb of the injured side is of the same length as the sound limb,

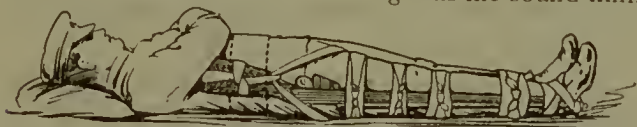


Fig. 124.—Rifle splint; showing butt loop and perineal band passed through it.

and the perineal band is securely tied so that the length of the limb is maintained. The other bandages are then applied to the thigh and leg.

BANDAGES

Bandages are applied (*a*) to keep splints and dressings in their places; (*b*) to support an injured part or a

dilated vein; (c) to sustain pressure upon a bleeding surface; (d) to promote absorption, prevent swelling, etc.

Bandages are of various shapes: (1) Triangular bandages; (2) in long lengths, roller bandages; (3) tailed bandages, four-tailed or many tailed; (4) quadrangular bandages, the "square bandage"; (5) T-bandages.

1. The triangular bandage is made of unbleached calico, of linen or cotton-sheeting, or, as in the case of large bandana handkerchiefs and neckerchiefs, of silk.

Size.—To make a triangular bandage from a piece of calico (or linen) not less than 38 inches (40 or 42 inches is better) in width, tear off the selvedge, and cut

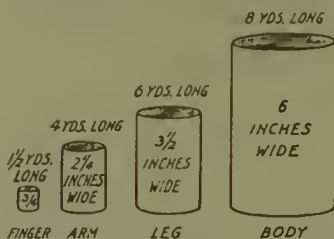


Fig. 125.—Regulation widths and lengths of roller bandages.

off a piece 38 (40 or 42) inches long, i.e. a square piece 38 by 38 inches. Fold the material so as to make a triangle, and cut along the fold from one angle to the other; two triangular bandages are thus formed.

For the various methods of folding and application, see the First Aid Manual.

2. The roller bandage may be made from unbleached calico, bleached calico (sheeting), linen, flannel, domestic, gauze, etc. (not flannellette).

Size.—For the various kinds of roller bandage the sizes (Fig. 125) are:—

	Width	Length
Finger Bandage*	$\frac{3}{4}$ inch	1 to 3 yards
Arm ,,	$2\frac{1}{4}$ inches	4 yards
Leg ,,	$3\frac{1}{2}$,,	6 ,,
Body ,,	6 ,,	8 ,,

* For one finger 1 yard will suffice, but 3 yards are required when all the fingers are to be covered (the continuous finger bandage).

When a bandage is rolled from one end only it is termed a single-headed roller ; when from both ends, a double-headed roller.

To roll the bandage.—Take hold of one end of the material and roll it tightly as follows : Keep the thumbs on the upper aspect of the roll, the forefinger of either hand beneath the roll. As the rolling proceeds, the forefingers are pressed firmly against the roll and the thumbs advanced so as to keep tightly in place the material which is being rolled ; the ball of the thumbs and the palm of the hands serve to prevent the bandage from bulging laterally.

If an assistant is helping, he should keep the free end of the bandage fairly firm, letting it slip through his fingers gradually. If no assistant is available, one end of the bandage must be fixed or tied to some convenient article of furniture ; the bandage is held taut at the other end by the person rolling, who gradually advances as he proceeds with the rolling. If no other means are at hand, as in the open, the foot may be placed on the bandage and the bandage rolled downwards towards the feet, allowing a fresh piece to slip until the whole is rolled up. The boot should not be allowed to touch the bandage, but a piece of paper or clean handkerchief placed between the boot and the bandage.

When the bandage is much creased or twisted the material may be straightened by allowing it to pass over the bars of a chair.

A patent rolling machine should be supplied when bandages have to be rolled in quantities.

It is well to fix safety pins to secure the end of a roller bandage when in store ; the pin is also available to pin the end of the bandage when applied.

Never begin a bandage by taking straight turns round a limb to "fix" it ; this leads to dangerous compression and congestion of the parts below by obstructing the venous circulation. The roller bandage should always be applied in a spiral manner.

For methods of application, *see* the Red Cross Nursing and First Aid Manuals.

3. Tailed bandages. i. *Four-tailed.*—A piece of calico or other material, of width and length sufficient

for the part of the body to which it is to be applied, is torn in equal sizes from both ends, leaving a portion in the centre of the material undivided.

This is the form of bandage usually applied for fracture of the lower jaw, to retain a dressing on the head, etc.

ii. *Many-tailed.*—This bandage is usually applied to the trunk or thigh, and is in principle the same as the



Fig. 126.—Bandage to protect the head when travelling.

four-tailed bandage, but the material is of greater width, and instead of two tails at either end several may be made, varying in number according to the part of the body to which it is to be applied. The ends overlap so that no pins are required to fix any of the tails except that last applied. The ends of the bandage may be tied so as to form a half knot, the ends being kept in place by the next turn.

4. **Quadrangular or square bandage.**—A large neckerchief may be used to cover the head, ears and neck, to protect these parts from cold, as when travelling

in a railway carriage, or bivouacking (Fig. 126). Fold the bandage crosswise so that the upper fold falls short of the lower by 2 or 3 inches, the length of the nose, in fact. Lay on the head the bandage so folded so that the ends fall equally on the sides of the neck and shoulders; bring the margin of the under layer to a level with the tip of the nose; the upper layer will be level with the eyebrows. Seize the corners of the outer fold, bring them underneath the inner corners, and tie them off underneath the chin. Turn back the inner fold from off the face, seize the corners of the inner fold, carry them to the back of the neck, and tie off.

5. T-bandage.—This is usually applied to the lower part of the body, to retain dressings and to exercise a certain degree of pressure. Take a turn or two of a roller bandage round the lower part of the body, tying in front. Bring the roll down between the thighs, up behind the hips, make a loop over the bandage at the back, and then backwards from front to back a sufficient number of times.

DRESSINGS, ETC.

Wounds are covered by dressings of various kinds for the purpose of (a) keeping the wound clean or aseptic; (b) sustaining equable pressure on the wound and its surroundings; (c) keeping some antiseptic material in contact with the wound; (d) excluding air; (e) absorbing exudation; (f) promoting healing.

Materials used in Dressings. *Surgical Lint.*—Plain lint is white in appearance; it shows a smooth side and a fluffy side; the smooth side only should be placed next the wound. Lint should never be torn, but cut with scissors to the requisite size. When applied double, as it usually is, the fluffy surfaces are turned inwards towards each other. *Boric lint* is surgical lint dipped in a solution of boric acid and coloured a pink colour with carmine, so that it is readily recognised.

Gauze.—Fine gauze (prepared cheese cloth) is used as a dressing for wounds, as a “packing” for deep wounds which it is not advisable to close, and as a means of isolating the area of operation whence blood, pus, bile or other material might spread widely during

operations on the abdomen or other regions. Gauze may be plain, recognised by its white colour; or it may be impregnated with iodoform (yellow) or cyanide (mauve). It is a ready absorbent, and when cut into squares of 6 inches and in several layers (four to eight) it is an excellent substitute for sponges.

Absorbent cotton-wool is ordinary cotton-wool freed from its natural oil and thereby rendered absorbent. Cotton-wool may be plain (white) or impregnated with various materials. Thus there are boric wool (pink), iodoform wool (yellow), alembroth (mercuric) wool (blue), double cyanide (mercuric) wool (mauve), salicylic wool (crisp feel and slight pink tinge).

Plain cotton-wool is seldom applied next the wound, but is superimposed in thick layers over other dressings, such as gauze. When secured by a bandage the wool exercises equable pressure on the part, and absorbs any oozing or discharge from a wound. The wool, impregnated with chemicals and coloured as described above, is used as swabs for wiping wounds clean and as temporary dressings, wet or dry, or over powders such as boric acid, iodoform, etc., dusted on the wound. For padding splints and making pads, ordinary non-absorbent cotton-wool is used. (*See the Nursing Manual.*)

Gamgee tissue consists of layers of cotton-wool enclosed between layers of gauze, and can be readily cut into squares to make pads or swabs.

Less used materials are—*paper lint*, which is made from wood pulp, and used as a substitute for lint where special economy is desired. *Wood-wool*, made from pine wood and treated chemically, is cheap, soft, and elastic, and absorbs better than cotton-wool. *Peat moss*, specially prepared and issued in mass or compressed sheets, is a highly absorbent material, and possesses many advantages as a substitute for cotton-wool and sponges. *Carbolised tow* or *carded oakum and tenax*, made from hemp or flax, or by teasing hempen rope, is a useful dressing for large wounds with foul discharges, bed sores, etc.

Improvised dressings for wounds may be made from any piece of linen, cotton, butter cloth, silk, fine muslin,

etc., washed and sterilised. In emergency clean note-paper, not printed paper or paper that has been written upon, may be used next a wound for first-aid or temporary purposes; an envelope may be laid open, and the clean or inner (unwritten-upon) surface placed on the wound. If the paper is heated before the fire until lightly scorched it will be sufficiently sterile. Burnt paper laid next the wound will be still better. Ashes obtained by burning wood, clothing, or vegetable tissue are, when sufficiently cooled, a sterile dressing of value. The ashes from a burnt garden-rubbish heap are usually readily obtainable in any country district, and if employed soon after cooling are quite safe substitutes for boric acid, iodoform, etc.

Impervious Dressings.—Oiled silk (green), gutta-percha tissue (brown), jaconet (pink), mackintosh (light grey), are the impervious materials used in surgery. Oiled silk may, after disinfection by wiping with carbolic acid 1-20, or other antiseptic, be applied next a wound, or placed over a wet dressing to prevent absorption of fluid by the superimposed bandage or dressings. Gutta-percha tissue forms a convenient method of dressing a finger wound. After cleansing the wound a dressing of lint or cotton-wool may be applied, and the whole wrapped round with the gutta-percha tissue. This may be fixed by touching the end of the wrapping with chloroform or ether, or holding it in the flame of a match or candle, when the gutta-percha melts and is made to adhere to the rest of the wrapping. Jaconet is usually placed over a dressing to keep it clean, or to cover a fomentation. Mackintosh sheeting is employed to prevent the mattress from getting soiled or soaked by discharges, etc.

Sponges and their substitutes are employed in operations and dressings for the removal of blood, etc., or for temporary packing of a wound. The ordinary marine sponge in common use cannot be boiled or sterilised by heat or steam. Its use is therefore debarred for field work and is confined to the operating theatres of hospitals.

Artificial sponges or swabs consist of absorbent gauze (butter muslin is the best) made with a swab or pad,

or of absorbent cotton-wool enclosed in gauze. The swab must not be packed too tightly, otherwise it cannot absorb readily. A swab $2\frac{1}{2}$ inches across and $2\frac{1}{2}$ inches deep is a convenient size for general use, but larger sizes are often required. To make a swab, take 6 inches square of gauze, lay a piece of absorbent cotton-wool as large as a golf ball or an ordinary watch in its centre, bring the margins of the gauze together, enclosing the wool, turn in the free edges of the gauze where they meet, and tie the "neck" with a linen thread; securely cut off the ends of the thread close to the knot. The swabs can be sterilised in the ordinary way.

Pads of "Aertex cellular" stout shirting folded in pads 6 inches square, with edges turned in and hemmed, are excellent substitutes for marine sponges.

Plaster Strapping.—To bring the edges of wounds together, to retain dressings as a means of supporting a joint, or of causing absorption by pressure, adhesive plaster is in frequent use. Diachylon plaster (lead plaster) is supplied in sheets, and is cut in strips of required length and breadth for application. This plaster must be warmed before use by holding the strip (plaster side outwards) against a can or jug of hot water. It is therefore inconvenient for field work. Mead's plaster in rolls of convenient widths, from $\frac{1}{2}$ inch upwards, wound round a metal reel, sticks firmly without being heated, and is suitable for "field" work. When being applied to hold the edges of a wound together, fix one end of the strapping on the sound skin some inches from the margin of the wound. Bring the edges of the wound together between the finger and thumb with the free hand, and whilst thus grasping the skin, pull the strapping across and fix it on the opposite side of the wound for an equal distance on the two sides. When removing the plaster from the wound, raise both edges at once and slowly and equally raise the strapping from the skin, so that there is no dragging of one side of the wound more than the other. Should any of the plaster material stick to the skin, this may be removed by dabbing turpentine upon it, rubbing olive oil over it, or wiping with a hot cloth or lint. The skin should be shaved if the plaster is to be applied on any hairy part.

Surgical Needles.—Surgical suture needles are of various shapes and sizes: straight, half-curved, full-curved, needle on handle.

Needles may be round-bodied like an ordinary sewing needle, or flat with cutting edge. The point may be plain or triangular. The eye may be oval or round, or of the spring variety. The round-eyed needle is more easily threaded than the oval, and the spring-eyed, easiest of all.

Sutures.—The suture or thread by which wounds are sewn up may be of silk, linen, catgut, silkworm- or fishing gut, horsehair, silver wire, or tendon from several animals—kangaroo, reindeer, whale, ox, etc. Of these, catgut is readily absorbable, that is, it becomes absorbed by the action of the tissues of the body, and therefore does not require removal. When the deep parts of a wound are sutured by catgut, and the wound is sewn up, the catgut suture is said to be “buried”; in a short time it is completely absorbed. Silver wire, silk or linen sutures may also be buried, but they are never absorbed.

All sutures may be obtained ready sterilised for use. Should, however, silk or linen thread only be available, boiling for 20 minutes is necessary, and the thread must be subsequently preserved in some antiseptic solution. Silk may be in the form of twisted silk, the varieties of which are ordinary surgical silk, cable twisted silk, and saddler's silk.

Silkworm gut and fishing gut may be sterilised by boiling for 20 minutes; silver wire, in the flame of a spirit lamp or by boiling. Horsehair should also be boiled 20 minutes before use.

Never boil catgut or tendon suture material.

First Field Dressing.—When soldiers go on active service the first field dressing is sewn on the right side of the skirt of the frock. It consists of:—

- (1) Outer cover, sewn cloth.
- (2) Two safety pins, wrapped in waxed paper.
- (3) Inside cover of waterproof jaconet, the edges cemented with rubber solution, so as to render the packet air-tight; a portion of one of the corners is turned back and not cemented.

(4) Loose woven bandage, $2\frac{1}{2}$ inches by $4\frac{1}{2}$ yards, folded flat into $2\frac{1}{2}$ inches by 4 inches.

(5) Two pieces of gauze, 17 inches by 13 inches, folded separately to suit the size of the package.

(6) Compressed absorbent cotton-wool between layers of gauze (like Gamage tissue).

The pieces of gauze, the compressed absorbent cotton-wool, and the layers of gauze contain 1 per cent. by weight of sal-alembroth, and are tinted with aniline blue.

The contents are compressed so that the package does not exceed three-quarters of an inch in thickness.

Printed directions for outside cover :—

WAR OFFICE, MEDICAL DIVISION

First Field Dressing

*Contents :—*Two pieces of gauze, wool pad, bandage and pins.

Tear black thread in centre of long stitch. Apply first, gauze ; second, wool pad. Fasten lightly with bandage and pins. If two wounds, apply one piece of gauze to each, and split wool pad.

Printed label of directions for inside cover :—

WAR OFFICE, MEDICAL DIVISION

First Field Dressing

*Directions :—*Tear open this envelope, and apply in the following order :—

*If one wound :—*1st, Gauze.

2nd, Wool pad.

Fasten lightly with bandage and pins.

*If two wounds :—*1st, One piece of gauze to each.

2nd, Split wool pad.

How to apply First Field Dressing.—In applying the first field dressing, care should be taken to place it directly on the wound without in any way touching with the fingers either the wound or the surface of the dressing which will be in contact with the wound.

This may best be done by taking hold of the dressing by pinching it up at the back, then everting it, and applying the fresh surface direct to the wound. No attempt should be made on the field to clean up the wound.

CHAPTER XV

SURGICAL CLEANLINESS

CLEANLINESS is of the first importance in all departments of surgical work. Hands, clothing, instruments, dressings and the room must be clean in the surgical, not merely in the housemaid's or scrubber's sense of the term. In time of war the subsequent details may be—in fact, will be—impossible to carry out, but the ideal must always be attempted.

The Hands.—Before commencing to dress a wound, however simple it may be, the hands must be as clean as possible. The following rules are to be observed:—

Cut the nails short and remove all hangnails. Bare the arms to above the elbow. Soak the hands for three minutes in water as hot as can be borne. Rub soft soap or ordinary toilet soap for three minutes into the skin of the hands and forearms vigorously, occasionally wetting the hands in the hot water during the process. While the hands are immersed in the hot water, scrub them, especially beneath the free part of the nails, with a nailbrush, for two minutes. Extend the scrubbing to the forearms.

A fresh clean nailbrush must be employed to rub off the soap whilst the hands and forearms are held beneath running water. Finally the hands and forearms are scrubbed in a watery solution of biniodide of mercury (1 in 1,000) or carbolic acid (1 in 40), or any of the ordinary disinfectants in use. If none of these disinfectants is to be had, the hands, after washing with soap and hot water, may be rubbed all over with a clean piece of flannel soaked in methylated spirit, spirits of wine, ether, or even whisky, gin or brandy. After the hands have been cleansed nothing that has not been sterilised—that is, rendered clean or aseptic, free from germs—must be touched until the operation is over. If an instrument falls on the floor it must not, the hands having been cleansed, be picked up by anyone taking

part in the operation. To touch a bottle, a piece of unsterilised dressing, the patient's clothing, or to open a cupboard-door in search of dressings or instruments, renders the hands unclean. To scratch the head, to wipe away perspiration from the face, or to blow the nose with an unsterilised handkerchief, is an unpardonable transgression against surgical cleanliness. When the nose requires wiping or perspiration removing, a sterilised piece of cotton-wool, gauze, linen, lint or tissue-paper must be used, and the material thus soiled thrown into the waste receiver.

Clothing.—It is advisable, before dealing with open wounds, for the dressers or assistants, as well as the surgeon, to be enveloped from neck to feet in a clean overall, if such can be had. An overall may be improvised from a sheet fastened round neck and waist by pins or cord in such a way as to serve the purpose. A farm labourer's clean "smock" would suit admirably. A large linen or holland or cotton apron may be placed on the front of the body; the upper end, having a tape attached, may be suspended from the neck and the apron tied round the waist.

It is well also for those taking actual part in important operations to wear gauze or cotton caps or handkerchiefs over the hair of the head, and gauze face-masks to cover nose and mouth, and to put on sterilised rubber gloves. The nurse or orderly handing instruments from the instrument tray should wear rubber gloves. Even onlookers near the operation table should wear a cotton or linen cloak from neck to heels.

Instruments.—All members (men and women) of Voluntary Aid Detachments should be taken to a hospital or an improvised operating theatre, and the methods of sterilising instruments and dressings actually demonstrated. Instruments intended for use during an operation or whilst dressing a wound should be carefully sterilised. Non-cutting instruments, such as forceps, probes, and retractors, should be boiled in water for 20 minutes; that is, they must be kept for that time in the water after it has come to the boil. Cutting instruments, knives, scissors, etc., should have the grease removed with methylated spirit

or ether and be boiled for two minutes only; if for longer, the edges of the instruments are dulled. The addition of bicarbonate of soda (baking soda) or carbonate of soda (washing soda), a teaspoonful to a pint of water, prevents the instruments from being discoloured by boiling, and has other advantages.

When the instruments are thus sterilised, they are removed from the water and spread upon a sterile sheet or towel and immediately covered over with a sterile towel, or they may be immersed in antiseptic solutions in shallow dishes, such as plates or enamelled trays.

The instruments must be removed from the steriliser either by pouring the water off and then tilting the instruments, without touching them, on to the clean towel or cloth, or by lifting them one by one from the steriliser with sterilised forceps or rubber-gloved hands.

The antiseptic solution in which instruments are placed should be non-corrosive, as (for example) if the solution contains mercury they will be discoloured or blackened and the edges of knives and scissors ruined. Carbolic acid solutions (1 in 40 or 1 in 60) for non-cutting instruments, and methylated spirit for knives, scissors, etc., answer well.

After instruments have been used at any operation or during the dressing of a wound they are to be washed in cold water, sterilised by boiling for ten minutes, dried, polished, and placed under cover in boxes or cupboards until required again.

Sterilising.—Overalls, towels, sheets, bandages, cotton wool, gauze, everything likely to come in contact with the patient, or to be handled by the surgeon or his assistants in the proximity of the table or bed, must be sterilised. The sterilising is usually done in hospital in so-called drums or kettles.

A drum or kettle in its simplest form is a box, the lid of which can be clamped down. In the sides of the box are numerous perforations which can be closed by a sliding band. When sterilising is to be done, a lining of linen or four-fold gauze is fitted into the interior of the drum, and inside this lining the towels, sheets, dressings, etc., are laid, the lid is fixed down, the per-

forations are left open, and the drum with its contents placed in water in a big pan, or copper, or soup cauldron (or steam steriliser), and boiled for 20 minutes. At the end of this time the drum is removed, the perforations are closed, and the articles kept in the drum until required. When no special apparatus is to hand, the sheets, towels, overalls, gowns, etc., may be simply boiled in a copper and left there until wanted, or the greater part of the water may be baled out with a clean jug, the lid of the copper replaced, and the articles kept in the steam until required.

Sterilisation of utensils, such as jugs, basins, cans, may be carried out by boiling in the copper or wash-house boiler, or if this plan is not available the articles may be boiled in pans or pots. The jugs, cans, etc., when removed from the water, are to be stood bottom upwards on a sterilised towel and covered over with another sterilised towel until required.

Sterile Water.—When water is to be sterilised, the vessel (copper or boiler) in which it is to be prepared is first thoroughly scrubbed with washing soda and rinsed with hot water. When the water has been boiled for 20 minutes it is transferred to sterilised jugs and covered with sterilised towels.

Preparation of Patient for Operation.—The surgeon sees to the medicinal treatment necessary by way of preparing the patient for operation.

The assistants or the nurses carry out his directions as to the details of disinfection necessary for the skin. In its entirety this consists in administering a bath, during which the skin over and around the probable site of operation is especially well lathered with soap and washed. After the bath the skin of the part to be operated on is shaved, washed and scrubbed again with a swab moistened in ether, alcohol, or other spirit, and covered with a large compress of four folds of lint wrung out of an antiseptic solution, such as 1-in-60 carbolic acid. Over the wet lint a piece of mackintosh or oiled silk is placed, and the whole retained by a bandage. The process may be advantageously repeated, as far as scrubbing the skin and covering with compress is concerned, some hours

before the operation is to be performed. When the operation is actually about to commence, the dressings are removed by an assistant or nurse who is not to take actual part in the operation, or with forceps by an assistant; the skin is again scrubbed with soap and water, dried with a sterilised towel, and vigorously wiped with sterilised swabs soaked in biniodide of mercury, in spirit, or some other disinfectant.

Alcohol in the form of methylated spirit should always be to hand for washing the patient's skin and the hands of the surgeon, and for placing cutting instruments in before use.

A simple method of preparing the skin, after washing, shaving and scrubbing it as above detailed have been carried out, is to paint the proposed site of the operation and a wide area of skin around with tincture of iodine, say, six or eight to ten hours before the operation, and to cover over the painted portion with a thick (2 or 3 inches) layer of sterilised surgical wool and bandage the wool in its place. When the operation is about to commence, and after the dressings are removed, the skin is again painted with tincture of iodine and allowed to dry for a few minutes.

Disinfectants.—The following substances may be used as disinfectants for the skin:—

Lysol	...	Strength for use	1 in 100 (or 1 in 50)
Creolin	...	" " "	1 in 100 (or 1 in 50)
Cyllin	...	" " "	1 in 200
Izal	...	" " "	1 in 200
Lysoform	...	" " "	1 in 20
Chinosol	...	" " "	1 in 50
Formalin	...	" " "	1 in 100
Sulphurous acid	...	" " "	1 in 20
Boric acid	...	" " "	saturated solution
Resorcin	...	" " "	1 in 60

Dressing Operation Wounds.—However simple the wound, it is essential that all the precautions necessary to be taken before engaging in an operation must be strictly observed in dressing the wound.

Cleansing of the hands, wearing clean apparel, the protection of the part to be dressed from infection of bed-clothes, the use of sterilised dressings and instruments, must all be rigidly carried out, otherwise the

wound may become infected, and blood-poisoning result. For example, to dress a wound in the leg whilst the patient is in bed, proceed as follows: Cover a table, seat of chair, stool, or, if none of these is available, a suitable box, with a clean towel, and put it close to the bed on the side of the limb to be dressed. On the "table" thus covered, place a tray, soup-plate, or flat dish, with necessary instruments in a solution of carbolic (1 in 40) or other convenient antiseptic fluid; if none of these is to be had, use plain boiled water to immerse the instruments in. Place under cover of a sterilised towel on the table the dressings to be applied, or retain them in the steriliser, to be removed when wanted. Bare the limb to be dressed by throwing off the bed-clothes, and tuck them back so as to expose the limb from the knee downwards. Pass a piece of mackintosh, covered with a clean towel, beneath the limb thus exposed. If the bandage supporting the dressing is soiled, it may be cut through with scissors. This is a common custom in hospitals, and is done also when the bandage is not soiled, a totally unnecessary and wasteful proceeding. In a campaign, bandages are usually at a premium, and should never be cut, but unrolled from the limb, washed, dried, ironed if possible, and rolled tightly for future use. After removing the bandage, the dresser must wash the hands again very carefully. It is better not to dry the hands after washing, so that they may not be infected by wiping with a possibly soiled towel. On the bed-clothes around the exposed limb should be placed sterilised towels, so that none of the bed-clothes are to be seen; the part to be dressed is thus exposed and isolated, so that contamination is impossible. The dresser now removes the dressings from the wound with sterilised dressing forceps, the wound is examined and dressed in whatever way necessary, the bandage reapplied, and the towels employed placed in the soiled linen basket. All instruments, dressings, bandages, and towels used at the operation, however clean they may seem to be, or however little exposed, must be washed and sterilised before being again used at operations or during dressings.

CHAPTER XVI

WOUNDS AND WOUND TREATMENT— RELIEF OF PAIN, ETC.

BRUISES, WOUNDS, ULCERS, ETC.

Bruises or Contusions.—When a blow is severe, blood escapes beneath the skin, causing a discoloration which gradually deepens in colour until it becomes black (hence the familiar expression, a black eye). After a short time the discoloration clears up by the absorption of the blood, and the part assumes a lighter hue, passing through green and yellow tints until the normal colour is resumed. The same phases are observed when the blood-vessels are torn by a broken bone, or when a sprain occurs, and the blood becomes diffused or extravasated through the surrounding tissues and beneath the skin.

Abrasion.—This term is applied to a mere scraping, scratching, or ruffling of the skin, as occurs when one falls on the hands, knees, or face, whilst running.

Incised Wounds.—In an incised wound the skin is cut by a sharp instrument, the wound gapes, the edges are everted and clean cut. The hæmorrhage may be capillary, arterial, or venous, according to the depth of the wound.

Lacerated Wounds.—When a piece of the skin, or any part of the body, is torn off, as in machinery accidents or shell wounds, the wound presents an irregular appearance and is said to be lacerated. Hæmorrhage is seldom severe, but the danger of recurring hæmorrhage after the shock of the wound passes off is imminent. A tourniquet should be loosely applied between the wound and the heart, ready to be tightened immediately hæmorrhage appears.

Contused Wounds.—A severe blow from a blunt weapon may cause the skin to be torn and a large

quantity of blood extravasated or diffused around it. Hæmorrhage is seldom severe in these cases, a slight oozing being the rule.

Punctured Wounds.—These are caused by stabs of a pointed instrument, such as a knife or dagger, or by a bayonet thrust. The aperture appears small, and the depth to which the stab has gone cannot be gauged. Hæmorrhage will depend upon whether or not a large blood-vessel has been injured. The wounds are chiefly dangerous on account of their depth and from the fact that a piece of the clothing may have been carried into the depths of the wound.

Gunshot Wounds (*see* Bullet Wounds, p. 166).

Aseptic and Septic Wounds.—The wound made by a surgeon during operation is said to be aseptic or clean when the patient's skin, the instruments and the surgeon's hands have been "prepared," that is, rendered aseptic before commencing to operate. Septic wounds are injuries to the skin in which infecting material (germs) gains access to the wound either at the time of the wound being made or subsequently.

Inflammation.—When the tissue beneath the skin becomes inflamed, redness, heat, swelling, and pain are all present, due to the increased quantity of blood brought to the part. When inflammation occurs in an organ these evidences are not all present; thus, if the liver is inflamed there will be pain, but there is no skin redness nor is there local heat perceptible to the hand placed over the liver; the thermometer, however, will reveal an increased body temperature generally. Inflammation may end in resolution; that is, may disappear, leaving little or no change in the part attacked. On the other hand, it may end in the formation of a local abscess, containing pus.

Pus is the thick, creamy-looking "matter" that comes from an abscess in quantity, or from the surface of an open sore in minute quantities. Under the microscope pus, as stated on an earlier page, is seen to consist of small cells floating in a fluid (the serum or fluid part of the blood). These cells are derived from the white corpuseles of the blood

Abscess.—An abscess is a local collection of pus.

Abscesses may occur immediately beneath the skin, or in any organ, joint or bone of the body.

Ulcer.—An ulcer or sore may occur on the skin, in the mucous lining of the alimentary canal from the mouth downwards, on the surface of the eyeball, etc. When the superficial parts of the skin or mucous membrane are destroyed, either as the result of injury or by inflammation of the skin, or by destruction of the tissues beneath the skin, and then of the skin itself, an ulcer may result. An ulcer (*a*) presents an ulcerated surface covered by reddish points like pin heads, termed granulations. (*b*) The edges are on a level with, or raised above, the ulcerated surface, according as the healing process is satisfactory or not. At times the surface of the ulcer protrudes beyond the level of the edges, when the granulations are said to be excessive—"proud flesh." (*c*) There is a discharge, which may be thin and watery, or may consist of pus that may be "healthy" and "creamy" in appearance, or foul-smelling and blood-stained. (*d*) The surrounding parts may be hard and swollen, or may present a natural appearance, according as the ulcer is unhealthy or is healing.

Bed-sores.—When a patient is compelled to lie on the back in bed the skin may become tender and "break down" at any point where the pressure is great. In cases of paralysis this is especially likely to occur, but in persons confined to bed by a long illness or with a fracture of the lower limb, bed-sores have also to be guarded against. The skin may break down over the rump bone (sacrum), over the hips, the calves of the legs, the heels, or even between the shoulders over the spine. Bed-sores are prevented by washing with soap and water any part that by change in colour seems to be threatening to break down, drying it carefully, then dabbing spirits of wine, methylated spirit, or, in their absence, brandy, whisky or gin, freely on the part and finally dusting with dusting powder, boric acid, or any toilet powder. This process may be repeated several times daily, if need be, and it may be necessary to prevent any pressure on the part by a circular cushion (air or padded) placed so that the pressure is on the surrounding parts. Above all, it

is necessary to keep the part dry; this is very difficult to do when the patient is paralysed and the excreta from the bowel and bladder are constantly escaping. When the skin has actually given way, treat the sore as a septic ulcer.

WOUNDS IN WAR.

The first-aid training possessed by members of Voluntary Aid Detachments on joining consists of the treatment of accidents and sudden illnesses met with in civil life, and although there are no differences in the principles to be followed in military work, some special points are worthy of attention.

Bullet Wounds.—The modern rifle bullet is so small in comparison with the bullet formerly in use that the wounds it causes seem trifling as regards dimensions. The bullet may lodge in the tissues, or it may completely traverse the trunk or limb, leaving an aperture of "exit" and of "entrance." The opening of the aperture of entrance is usually quite small, the skin seems cut rather than bruised, the edges are depressed, being driven in by the bullet on its course. The track of the bullet is the course it follows in the tissues; this is usually straight, but the bullet may be deflected by a bone, and the track is then continued onwards at an angle to the original direction.

The aperture of exit is larger than that of entrance, the edges are more ragged, and the wound pouts owing to the skin being driven before the bullet in its path. The chief immediate dangers of a bullet wound are:—

1. *Wound of a Large Blood-vessel in a Limb.*—A large artery may be wounded, causing immediate danger from loss of blood. When the artery is in a limb, (a) arterial blood may issue at one or both apertures; (b) the blood may escape into the tissues of the limb, causing much swelling; (c) the arteries in the limb beyond the wounded artery will cease to pulsate, and the temperature of the part falls.

The *treatment* is to arrest the hæmorrhage at once at the nearest point practicable. If the trunk of the bullet is judged to have passed near the course of a large blood-vessel, a tourniquet should be placed loosely

round the limb above the wound, ready to be twisted tightly in case of hæmorrhage appearing subsequently. The limb must be kept warm, and the patient treated for shock.

2. *When a large vein is wounded*, the bleeding is venous in character, and the arteries beyond the seat of the injury will be found pulsating. The *treatment* is that for venous hæmorrhage generally (see the Red Cross First Aid Manual).

3. *When the heart or a large blood-vessel in the chest or abdomen*, such as the aorta or the iliac arteries, or the large veins, are wounded, death is instantaneous. Should the blood-vessel be of smaller dimensions, the signs and symptoms of loss of blood from internal hæmorrhage may more or less gradually supervene. The signs and symptoms of *internal hæmorrhage* are—Pallor of face and lips; a failing, fluttering pulse; feeling of faintness on attempting to sit or stand up; thirst; a sense of suffocation, yawning and sighing, throwing the arms about, or tugging at collar or throat; cold sweats, noises in the ears and dimness of vision may be complained of before the patient becomes unconscious.

Treatment.—Lay the patient down with the head low; raise the lower limbs and bandage the upper and lower limbs firmly from hands to shoulders, and feet to hips; give ice to suck (if the stomach is unwounded), undo tight clothing, allow for a sufficiency of fresh air. If the abdomen is the seat of injury, apply a large pad on this region with a bandage firmly wrapped round the body. If the wound is in the chest, incline the patient towards the injured side. Give no stimulant—neither alcohol, sal-volatile, nor any hot drink. As soon as possible apply cold by an ice-bag or a cold-water dressing over the seat of injury, and give ice to suck.

Bullet Wounds of Joints.—When a joint in a limb is traversed by a bullet, steady the limb, remove the clothing over the wounded spot, wash or wipe the wound with antiseptic fluid, do not probe it, apply antiseptic dressings over the wound, envelope the whole joint and the limb for some distance above and below the wound in a thick (4 to 5 inches) layer of cotton-wool and apply a splint to keep the joint at rest.

If the hip- or the knee-joint is the seat of injury, keep the limb straight; if it is the ankle that is wounded, maintain the foot at right angles to the leg; if the elbow-joint, bend the elbow at a right angle.

*Dressed thus, the wounded man is most likely to come under the charge of members of the Voluntary Aid Detachment. The dressings must not be disturbed forthwith, but the patient's temperature must be taken. the limb beyond the injured point must be examined to ascertain if there is discoloration or congestion of the skin, or swelling of the hand or foot, according as the upper or lower limb is wounded. If the temperature is raised and the limb uncomfortable, red or swollen, the fact must be reported to the surgeon in charge, or, if urgent treatment is demanded, the bandage must be slackened, and if necessary, and if possible in the exigencies of battle, removed under antiseptic precautions.

If a *bone* is fractured by a bullet, the aperture or apertures (entrance and exit) are covered with the patient's first field dressing, and the limb put in appropriate splints before he is moved. The lower end of the thigh bone (femur) and the upper end of the shin bone (tibia) may be traversed by a bullet without causing fracture. In such a case the wounds only have to be treated and the limb kept at rest.

Shell Wounds usually cause extensive injury. Part of a limb (hand or foot) may be completely torn off or left hanging by a mere tag of skin. Usually there is little or no hæmorrhage (primary) at the moment, but there is great likelihood of subsequent (secondary) hæmorrhage occurring.

Treatment.—Arrest primary hæmorrhage if present, and guard against secondary hæmorrhage by placing a tourniquet loosely round the limb at the nearest suitable point above the wound, and stand by ready to tighten the tourniquet should bleeding set in. Cover the injured part with an antiseptic dressing, and over it apply a layer (4 inches thick) of cotton-wool and bandage the part firmly. Apply a splint if need be.

Bayonet Wounds.—The bayonet of former equipment was triangular in shape, and inflicted a corre-

spondingly shaped wound in the skin. The modern bayonet is two-edged, and its thrust causes a wound similar to a stab with a large, rather blunt knife.

Treatment.—The wound must be wiped clean; do not probe it. Apply a clean dressing to the part, envelope in cotton-wool, and apply a splint if the limb is the seat of injury. Should the patient with a bayonet wound, already treated, come under the care of a member of the V.A.D., the latter should not undo the dressing, but, if the temperature be raised, the limb painful and swollen, report the matter to the surgeon in charge. But if no medical officer is available the dressing must be removed, and the wound and surrounding part covered with a hot borie fomentation.

Wounds of the Head, Neck, and Chest.—When a bullet strikes the *cranium* it may penetrate the brain and lodge there, or it may completely traverse the skull, showing apertures of entrance and exit. The result depends on the part of the brain through which the bullet travels. At times but little immediate mental disturbance may occur; but as a rule, and more especially when the bullet penetrates the structure near the base of the brain, unconsciousness comes on at once. The *treatment*, when there is no hæmorrhage from the scalp wound, is similar to that laid down for unconsciousness generally. The wound must not be probed, but cleaned and covered with an antiseptic dressing. When hæmorrhage of the scalp occurs, a ring pad is to be applied immediately. (*See the First Aid Manual.*)

Wounds in the *neck* involving large arteries or important nerves are usually immediately fatal. Should the danger be from an artery or a vein, digital compression may suffice to arrest the hæmorrhage until a surgeon can tie the vessel.

Wounds of the *chest* vary in their degree of danger. If the heart, the aorta, the large veins at the upper part of the heart, or the root of a lung are penetrated death is instantaneous. A bullet, however, may traverse the lung (not the root), and cause but few symptoms; in such cases the patient must be laid down and inclined towards the injured side, the clothing loosened, an antiseptic

dressing applied to the wound and kept in place by strapping (plaster); give ice to suck; keep watch for some hours for symptoms of internal hæmorrhage, due to the rupture of a blood-vessel between the ribs or in the lung substance. The blood in such injuries accumulates in the chest cavity (pleura); hence the importance of inclining the patient to the injured side whilst in the recumbent position, so that the injured spot becomes the most dependent, and the tendency to accumulation of blood is lessened.

Wounds of the abdominal organs are always serious. A bullet- or bayonet- wound in the *pit of the stomach* (i.e. just below the breast-bone) is especially dangerous, for the stomach may be injured, and the great group of sympathetic nerves immediately above and behind it destroyed. Shock, vomiting of blood, and escape of blood and contents of the stomach into the abdominal cavity are the most dangerous effects. *Treatment*: Lay the patient down in a comfortable position, apply cold over the wounded area, but keep the limbs warm; give nothing by way of the mouth.

The *liver* may be traversed by a bullet, and unless one of its larger blood-vessels is injured, few immediate symptoms may ensue. *Treatment*: Lay the patient down, turn him towards the injured (right) side; dress the wound antiseptically; apply cold over and around it; give ice to suck. Bandage firmly round the lower part of chest and upper part of abdomen.

The *spleen* when wounded causes almost invariably speedy death from hæmorrhage. *Treatment*: When the wound is seen to penetrate in the neighbourhood of the spleen, lay the patient down, turn him towards the injured (left) side, apply antiseptic dressing, apply cold over and around the wound, and treat for internal hæmorrhage.

The *intestine* when wounded may or may not give rise to immediate indications of what has happened. If such a wound is suspected, lay the patient down, dress the external wound, lay a large thick sheet of cotton-wool over the abdomen, bandage fairly tightly, and apply cold over dressing.

Wound of the *kidney* may be gathered to have occurred

from the position of the wound in either flank. by the subsequent appearance of a large swelling in the neighbourhood of either kidney, and by the presence of blood in the urine. *Treatment*: Lay the patient down inclined to the injured side, dress the wound, and apply cold.

The *bladder* may be wounded when it is full of urine by a bullet which passes immediately above the bones of the pelvis in front (the symphysis pubis). *Treatment*: Lay the patient on his back, with the trunk well raised, so that if urine escapes it accumulates in the lower part of the abdomen; apply dressing to the wound; if the patient cannot pass urine a catheter must be used as soon as possible.

RELIEF OF PAIN, INFLAMMATION, Etc.

Cold, applied by wringing out a piece of flannel or a towel in cold water (plain, or cooled still further by ice) and wrapping it round a painful part, will at times relieve pain. When an ankle or any other joint is sprained, cold thus applied as soon as the injury has occurred will relieve pain, but only temporarily. After a short time more comfort will be obtained from hot fomentations. An ice-bag to the head or towels wrung out of cold water and kept wet are useful in many cases of head injuries. If an ice-bag is not to hand, a sponge bag or any piece of mackintosh tied up bag-shape will suffice, the ice being broken up into small pieces before being inserted.

Heat. (a) *Dry Heat*.—Flannels or towels heated before the fire and frequently applied will help to relieve pain. A bottle filled with hot water and wrapped in flannel to prevent the skin being burned, or a hot brick thus protected, will accomplish the same purpose. The bottle may be of glass, stone, or indiarubber.

(b) *Moist Heat*.—Flannels or towels wrung out in hot water and applied over the painful spot relieve pain. Pain in the abdomen, whether due to colic or to inflammation, is especially treated in this manner. To prepare a hot fomentation for the abdomen: Take a wash-hand or other basin; across it lay an open towel, and on the towel place another, curled up into a ball, and over this pour boiling water until the towel is soaked;

wrap up the soaked towel in the open towel and twist the ends until no more water can be wrung out; to facilitate the process a "wringing stick" may be wrapped in the drying towel ends, whereby more power to wring dry is obtained. A poker, the handle of a brush, or a piece of wood may be used for a "wringing stick." The wet towel is now withdrawn, shaken out, and folded so as to cover the abdomen from the breasts to the groins and half way round the loins, and applied as hot as the patient can bear it. Over the fomentation a large dry bath towel is applied completely encircling the trunk, and pulled fairly tight, the end being fixed off with safety pins. The fomentation may be reapplied every half-hour, or every two hours, according to the amount of pain.

A *poppy-head fomentation* is made in a similar manner; break up half a dozen poppy heads and boil them in a kettle for half an hour before pouring the water in which they are boiled over the towel. Instead of poppy-heads a dessertspoonful of laudanum (tincture of opium) may be sprinkled upon the fomentation before applying it.

Poulticing.—To relieve inflammation of the surface of the body, or of a deep-seated organ such as the lung or liver, poultices may be used. The poultice in common use, made of linseed meal, should never be applied over an open wound, as such wounds are invaded by bacteria, and the moist and warm linseed meal affords a culture bed in which these germs thrive and multiply. The modern method of applying a "poultice" in such cases is to wring out a piece of boracic lint in hot water, lay it on the wound or ulcer, and cover it with an impervious material, mackintosh, jaconet or oiled paper, before applying a bandage. The linseed-meal poultice is still used, however, to relieve pain and inflammation, when there is no open wound, as in cases of pneumonia, etc. To make a *linseed-meal* poultice, use crushed linseed, i.e. linseed meal with the oil unexpressed. The basin in which the poultice is to be made must be warmed by pouring hot water into it, and then throwing the water away. A quantity of boiling water from a kettle just off the fire is poured into the basin, and the linseed

meal allowed to trickle in through the fingers until the poultice mass is sufficiently thick to allow of the spoon (or spatula) used in stirring it to stand upright in the mass. Empty the mass on to a piece of linen, tow, cotton-wool, or brown paper, of sufficient size, and spread it evenly, leaving an inch all round the linen uncovered by the mass. Now fold the edges of the linen (or other material) on to the edge of the poultice mass, and after testing the heat, apply it. To facilitate spreading the mass, wet the handle of the spoon, knife, or spatula. To test the heat, apply the back of the hand to the poultice, or hold this against the cheek, to make sure that it is not too hot. The poultice should be well covered over to keep it warm. A linseed-meal poultice should be changed every four hours.

Instead of using linseed meal, a poultice may be made of oatmeal, bread, or any clean material that can convey heat and moisture. A *bread* poultice, made by taking a slice of bread, cutting off the crust, placing the bread on a clean folded handkerchief and pouring water or milk, hot or cold, upon it, is a convenient method of applying a poultice to the eyelid, ear, or any part of the face. A *charcoal* poultice, made in the same way as a linseed-meal poultice, but using wood charcoal in place of meal, is sometimes applied to foul discharging surfaces.

Counter-irritation.—When inflammation is present in the eye, ear, or any organ of the trunk, blisters or irritating plasters are applied on adjacent spots to relieve the inflamed organ. When the eye is inflamed, the counter-irritation is usually applied over the temple; when the ear is inflamed it is applied behind the ear on the nipple-like (mastoid) process of bone met with there. For an inflamed organ of the trunk, counter-irritation is usually applied in the form of mustard plasters to the skin over the organ, be it the lung, the liver, &c., or in the form of a mustard pack.

Blisters.—A fly blister (*emplastrum cantharidis*), cut to size required, is in common use. It is spread on cloth, chamois leather or amadou; it is black in appearance and is usually covered with a piece of tissue paper. To apply to the temple, wash the skin with

soap and water and dry; remove the tissue paper and apply the blister to the temple, taking care that it does not touch the hair. Fix with a piece of strapping, cover with cotton-wool, and retain the whole by a handkerchief round or over the head. If no vesicle is raised in half an hour, put a hot bread poultice over the blister. When it has raised a vesicle prick this with a needle or snick it with scissors, catching the fluid which escapes in a piece of cotton wool or in a spoon. After emptying, apply thin films of absorbent cotton wool over the vesicle and retain by a strip of plaster until the part has healed, or if it is to be kept open, remove the raised searf-skin and apply an ointment.

Mustard Plasters.—A mustard leaf dipped in water and laid on the skin is the handiest method of using mustard, but ordinary table mustard may be used instead. Mustard plasters are used as counter-irritants short of raising a blister, to attract blood away from inflamed organs; and as a stimulant to the circulation in suspended animation, as in cases of apparent drowning, when they are moved from one part of the limbs or trunk to other parts at short intervals. They are usually made the size of the palm of the hand. To apply one, mix sufficient mustard with cold or tepid (not hot) water, fold a handkerchief to about 6 inches square; raise the upper fold and spread the mustard mass on the handkerchief beneath the upper fold. Lay the upper fold on the mustard and apply it to the skin. After 15 minutes it will cause redness and some tingling; at the end of 20 minutes at most, remove it, otherwise it may cause a blister to rise, which is not desired. Mustard oil rubbed on the skin will have similar action.

A *mustard pack* is made in the same way as a hot fomentation, but mustard in the proportion of one tablespoonful to a quart of tepid water is used in the water poured over the towel.

Leeches are applied to the temple, behind the ear, or over an inflamed deep-seated organ such as the liver or the lung. A single leech, or as many as a dozen, may be applied at one time. To apply to the

temple : wash and dry the skin ; remove the lid from the box or the paper from the glass in which the leech is contained ; hold the box or glass against the temple until the leech catches hold. Should it show no sign of biting, smear the skin of the temple with milk, or sugar-water, and apply again. When the leech ceases sucking, as can be observed when the undulations of its body cease, receive it in a spoon or glass. Should it not let go, sprinkle some table salt upon its head. Sometimes the wound it makes bleeds freely. To arrest the bleeding, apply pressure with the finger for a time ; if it does not stop, apply thin films of cotton-wool laid on layer after layer, and if necessary drop collodion on the wool freely. Should the bleeding still persist, raise the skin around the bleeding point between the finger and thumb, pass a needle (an ordinary sewing needle will suffice) so as to transfix the skin adjacent to the wound, cover the wound with a thin film of cotton-wool, and over the ends of the needle apply a thread (sewing cotton will do) in figure-of-8 fashion, pulling fairly tightly.

CHAPTER XVII

BATHS—WASHING THE PATIENT— DISINFECTION, ETC.

Baths.—The ranges of temperature of the several better known baths are approximately as follows :—

Hot bath	...	from 100 deg. F. to 106 deg. (or over).
Warm bath	...	.. 95 " " " 100 "
Tepid bath	...	.. 85 " " " 95 "
Temperate bath	...	.. 75 " " " 85 "
Cool bath	...	.. 65 " " " 75 "
Cold bath	...	.. 34 " " " 65 "

Shortly, it may be stated that a bath in water at the temperature of the body, 98·4° Fahr., is warm; if higher, it is hot; if a little below, tepid; if much below, cold.

Hot or warm water attracts the blood to the skin and relieves internal organs. Cold water drives the blood from the skin to the internal organs.

A **douche** is a stream of water directed against any part of the body. An **affusion** is a volume of water, as from a bucket, dashed on the body; useful in case of sunstroke, convulsions, etc. A **shower-bath** is a descent of water vertically through small apertures upon the body. A **wet pack** may be applied as follows: Make up a bed of mattress and pillow and spread two blankets over them. Wring out a sheet in cold water, spread it over the blankets, place the patient unclothed on the sheet and tuck him up in it from neck to feet, and cover him, thus enveloped, with several blankets. While the patient is so covered, watch the pulse, breathing, temperature, colour of the face, etc., discontinuing the pack if he is distressed. It may be maintained for a quarter of an hour or more, according to his state. When his temperature is reduced to nearly 100°, leave off, dry him and place him between dry blankets. The pack may be repeated several times daily if necessary.

To wash a patient in bed.—Spread a towel over the pillow to prevent it from getting wet whilst washing the head and neck. Bring one limb from beneath the bed-clothes, spread a towel beneath, wash and dry. Treat all the limbs in succession in the same way. Before washing the front of the body, tuck a towel on either side of the trunk to prevent the bed from getting wet. To wash the back, turn the patient on the side, tuck a towel between back and bed, wash thoroughly, dry carefully, and rub with spirits of wine to strengthen the skin if bed-sores threaten.

Hygiene of the feet.—Marching long distances can only be accomplished when the feet are in good condition. Avoid new, thin soled, or patent leather boots; avoid silk or cotton socks, wear stockings or socks of ribbed knitting (women prefer plain knitted). Darned socks should be avoided when blisters threaten or feet are tender. If the boots are roomy, two pairs of socks may be worn, and a layer of soap between the soles and heels will be found salutary. After a march, wash the feet first with hot, when possible, and then with cold water and dry well between the toes. If the feet are tender rub them with spirits of wine or whisky after drying. If blisters threaten, rub the soles of the feet and the toes all round with yellow soap moistened sufficiently to allow it to stick to the skin; rub also the inside and the outside of the sock with a moistened piece of soap. If the tenderness is extreme, put soft soap into the toe of the boot. When blisters form, thread a needle with cotton, silk, or wool, and pass the needle close to the margin of the blister (in what seems sound skin), right across, cause the point to emerge at a corresponding point on the opposite side and draw the thread (doubled) right through. Cut the thread half an inch from the blister, leaving two ends projecting on either side. Allow the thread to remain for some hours—all night if need be. Afterwards remove it. If the raised skin over the blister is very loose and ragged, remove it and cover the part with borie ointment or vaseline and a film of cotton-wool. If the socks and the insides of the boots are well rubbed with moistened soap the blister may give no more trouble.

The blistered heel or sole of the foot may, after the fluid has been allowed to escape, be covered with a film of cotton-wool, and a circular piece of plaster with a hole cut in its centre laid over the part, with another piece of plaster superimposed without cutting a hole in its centre.

Thermometers.—*The clinical thermometer* is used to take the temperature of the body. The temperature may be taken in the mouth, armpit or rectum. Before using the thermometer, wash and dry it and shake down the register a degree or so below the normal, 98.4° Fahr. Put the bulb of the thermometer below the tongue on one side; the patient must keep the mouth shut and breathe through the nose whilst the bulb is in the mouth. According as the thermometer is marked half minute, one minute, two minutes, it is to be kept in place a corresponding time. If no time is stated on the thermometer, keep it in place for four minutes; on removing it read the temperature, write it down, then wash the instrument in antiseptic solution, shake it down below the normal and replace in case.

Bath Thermometer.—This thermometer is enclosed in a wooden or metal frame for convenience of use. The temperature of the bath must be read off while the bulb of the thermometer is immersed in the water, as it is not self-registering and may run down quickly if removed from the water before the temperature is read.

The *wall thermometer* registers the heat of the room. The room ought to be kept at 60° Fahr. The thermometer should be hung close by the patient's bed.

DISINFECTION

Heat is the most potent disinfectant we possess. It may be applied (a) as dry heat, or (b) as moist heat.

(a) *Dry Heat.*—All foul or infected dressings should be burnt. An instrument held in the flame of a spirit-lamp or Bunsen's burner is speedily rendered germ-free; but the flame is injurious to metal, and therefore should only be occasionally used, as in emergencies. Dry air, when raised to a temperature of 284° Fahrenheit (140° Centigrade) and upwards, will destroy germs, but air at

this temperature is apt to injure fabrics and surgical appliances.

(b) *Moist Heat*.—Boiling water destroys all forms of germs if they are boiled for a sufficient time. Just as a boiled egg cannot be hatched, and as corn roasted in a kiln will not germinate, so boiled germs are rendered ineffective.

Steam is used for the sterilisation of sheets, towels, operating gowns, some dressings, and the carpets, bedding, blankets, rugs, curtains, etc., from the room of a patient suffering from an infectious disease. Steam sterilising for surgical purposes is accomplished by small sterilisers in our hospitals (p. 159); at disinfecting stations we find large apparatus where, by superheated steam and steam under pressure, articles of clothing, bedding, blankets, etc., are dealt with on a large scale.

At public disinfecting stations clothing, carpets, blankets, bedding, etc., are exposed to dry air at a high temperature in brick kilns, with wooden shelves on which the articles are laid.

Chemical substances of various kinds act as germicides and are in common surgical use. These may be applied in the gaseous state, as are sulphur, chlorine, etc., or in solution, as are carbolic acid, salts of mercury, formalin, etc.

Gaseous disinfectants are used for disinfecting dwelling rooms, public buildings, holds of ships, etc.

(a) *Sulphur* when burnt produces clouds of sulphur fumes, and therefore can be used only when the room is unoccupied. If all parts of the room are thoroughly moistened, and all apertures by which air from without might gain entrance are carefully closed, sulphur dioxide is a fairly efficient disinfectant. Four lbs. of sulphur should be used for every thousand cubic feet to be disinfected. Disinfection by sulphur is carried out as follows: Blankets, sheets, wearing apparel, mattresses, etc., must be so laid out that the sulphur fumes can reach both surfaces. The drawers are pulled out of the chest and placed against the wall, doors of the wardrobe and cupboards must be opened. The floor, the bedstead, articles of furniture, etc., are wiped over with a moist cloth. The windows are closed, latched,

paper is pasted over all cracks, the shutters are closed, the register of the grate is closed or the mouth of the chimney stopped up with canvas, shavings, or paper tied in bundles. A tub, bucket, or bath one-third full of water is placed in the centre of the room; across the bucket place tongs, and on the tongs stand a flower pot with earth in the bottom, or an old metal tray. In the flower pot or tray put the flowers of sulphur and set light to the sulphur by placing a live coal in it, or by pouring some methylated spirit over it and lighting the spirit, when the sulphur will burn. When the fumes are rising satisfactorily, leave the room, shut and lock the door, placing a mat at the foot to prevent access of air, and paste a piece of paper over the keyhole. The room is left closed for from 12 to 24 hours, when it is opened up and the blankets, sheets, mats, and mattresses are removed for further disinfection.

(b) *Chlorine Gas*.—Chlorinated lime, commonly known as bleaching powder, gives off chlorine, a useful disinfectant, but irritating, if in excessive quantity, to the eyes and throat. It can be used in moderate quantity, say $\frac{1}{2}$ lb., in saucers in two or three parts of an occupied room. The saucers are placed at some little distance above the level of the patient's head, as the gas, being heavy, tends to accumulate on the floor.

Disinfectant Substances used in Solution. *Carbolic Acid*.—Pure carbolic acid or phenol occurs in colourless crystals or as a fluid. It is recognisable by its odour. In making solutions, the water must not only be sterile, but warm: pure carbolic acid does not dissolve readily in cold water. Solutions should be kept ready in bottles or jars for use.

Solutions of the strength 1 in 60 or 1 in 80 may be used to disinfect utensils in the room, or placed in a tub or big jar intended for disinfecting soiled linen and kept outside the bed-room or ward.

Mercury.—Corrosive sublimate (other names are bichloride of mercury, mercuric chloride, or perchloride of mercury, or simply "sublimate") is a potent disinfectant and antiseptic, and solutions from 1 in 1,000 to 1 in 5,000 are in common use. Mercurial solutions have a most destructive effect upon metallic instruments.

Biniodide of mercury is a preparation in frequent use ; it is used as an alcoholic or spirituous solution at a strength of 1 in 500.

Formalin is used in a solution of 1 per cent. for spraying walls and for the disinfection of clothes, and in greater strength for the disinfection of wounds.

Iodine in the form of tincture of iodine is painted on the skin some few hours before operation, and again just before commencing to operate.

Alcohol at a strength of 70 per cent. is a potent germicide ; it is largely used for disinfecting the hands. Methylated spirit is useful for the same purpose. Cutting instruments are frequently laid in alcohol for the surgeon's use at operations.

CHAPTER XVIII

FOOD AND COOKING

HOW TO JUDGE THE QUALITY AND FRESHNESS OF VARIOUS FOODS

Milk.—Fresh cow's milk should possess the following characters :—

(a) Absence of peculiar taste or smell.

(b) When stood in a narrow glass vessel, the milk should be of full white colour without deposit.

(c) When boiled it should not change in appearance.

(d) When stood in a glass jug, it should show from 6 to 11 per cent. of cream. Supposing the glass to be 10 inches high, the top inch after the milk has stood for twelve hours ought to be cream, showing that there is 10 per cent. of cream; or if the vessel is only 5 inches high the top half inch should be cream.

(e). Further tests are the specific gravity—1030; and the application of litmus paper: if the red litmus paper shows a marked change to a blue colour it indicates an alkaline reaction, and the milk is usually bad.

To prevent milk from "turning," especially in hot weather, it should be boiled or scalded, a little sugar added, and it should be bottled. To scald milk let it simmer slowly until a thin skin collects on its surface. Remove the skin so formed. Scalded milk has not the objectionable taste of boiled milk, yet disease-giving germs, if present, are destroyed.

Bread.—When good, bread should exhibit the following qualities :—

(a) It should have not less than 30 per cent crust.

(b) The surface should be well baked, not burnt.

(c) The colour should be white (unless in case of brown or standard bread).

(d) The crumb should be honeycombed with small regular cavities.

(e) The crumb ought not to be tough.

(f) There should be no "acid" taste.

The average quantity issued per head per day to soldiers is 1 lb.

Meat.—The lean of fresh beef should show the following characters:—

(a) The lean should be firm and yet elastic; there should be no soft spots in the meat.

(b) The colour should be cherry-red, not livid, pale, or greenish.

(c) The odour should not be disagreeable. Meat first shows signs of "going wrong" nearest the bone, and a knife pushed into the centre of the piece of meat or down to the bone, if there is one, should when withdrawn give no unpleasant odour.

(d) Prime beef should present a "marbled" appearance, owing to the fat being distributed through the muscle substance, in place of being merely on the surface of the lean.

(e) A little reddish juice should ooze away from the meat as it stands on a plate.

The fat of beef should be firm, not like jelly, and not too yellow; there should be no hæmorrhage into the substance of the fat.

Tinned Foods.—A tin of food is known to be defective when—

(a) The tin is "blown," that is bulging out at one or both ends;

(b) The tin is indented;

(c) There is rust round the rim where the solder is applied.

Flour.—Flour is known to be good when—

(a) It is neither lumpy nor gritty;

(b) It has neither an acid taste nor any odour.

Oatmeal.—Meal made by grinding oats as in Great Britain—not the rolled oats from abroad got up under attractive names—is wholesome, sustaining, keeps a long time, and is readily cooked.

Rice.—The grains of rice should be clean and without grit, spots, or evidence of insects.

Potatoes.—Potatoes should be of good size, firm, should cut with some resistance, and show no dark spots within.

Butter.—By its smell and taste butter is readily judged. Salt is added to all butter, but it should not be more than (in fresh butter) 8 grains of salt to 1 ounce of butter (salt butter has 35 grains to the ounce).

Eggs.—To judge freshness, look through the egg by holding it between the eye and a bright light; when thus viewed it will be seen that fresh eggs are more transparent in the centre, old eggs at one end. When placed in salt water (1 ounce salt to 10 ounces water) good eggs sink, whilst the indifferent swim. Bad eggs float even in unsalted water.

Alcohol.—Alcohol in any form is not necessary in a general way during a campaign; no alcohol should be issued unless prescribed by medical officers.

CLEANING UTENSILS

Pots and pans, kettles and all cooking utensils must be kept scrupulously clean.

All utensils after being used should be filled with hot water and placed on the fire, so that the water is kept hot and the utensil well scalded; the water is then emptied out, and the utensil wiped and well dried.

An iron pot should have the "fur" removed frequently from the inside, should be scrubbed with sand and soap and then water boiled in it for half an hour. Tins can be kept clean by rubbing them with a cloth dipped in sifted wood ashes. A copper utensil can be cleaned by well scrubbing it with one-third salt and two-thirds sand mixed together, and then wiped out; lemon or vinegar will remove stains on copper pans.

Colanders, steamers and all tinware should be washed with soap and soda, dried, and then rubbed well with whitening. Knives and steel generally should be cleaned with brickdust and flannel; if they are rusty, a freshly cut potato dipped in ashes will remove the rust.

Plated articles are to be washed with soap and boiling water, and, while still hot, dried with a soft cloth.

Crockery and glass are to be washed in boiling water, then dipped into cold water and dried.

PRINCIPLES OF COOKING

Roasting.—A bright fierce fire is needed, especially

when roasting is to be done before an open fireplace, the idea of roasting being to coagulate the albuminous material of the meat on the surface, so as to prevent the juices from escaping.

The simplest form of albumin in bulk is seen in the white of the egg before being boiled, when the albumin is fluid; after boiling it is consolidated. In meat the albuminous material behaves in the same way. After exposure close to the fire, say for 15 minutes, the time varying according to the size of the joint, the roast is withdrawn to a greater distance from the fire and exposed for a sufficient time, so that the centre as well as the surface is cooked. The approximate time necessary for cooking a joint before a bright fire is 15 to 18 minutes per pound weight.

Basting.—During roasting the fat that drips from the meat is received in a pan placed beneath; every now and again the drippings are poured by a spoon over the joint as it is being roasted: this is termed “basting.”

When meat is sufficiently cooked, it will be noticed that the steam from it draws towards the fire, and if on pressing the lean part with the flat side of a knife the meat yields easily, it is presumably sufficiently cooked.

Roasting may be done in an oven, when the joint should be placed on a trivet, turned, and basted.

Before a camp fire a small piece of meat may be held upon a fork, or even a sharp stick. A number of pieces of meat can be strung upon one piece of stick or wire and roasted together. The lid of a biscuit box or a plate may be placed below the meat as it is roasting to catch the dripping, with which the meat may be basted.

Frying.—Frying is cooking meat in fat in an open pan. The “fat” may be a piece of suet melted down, or butter, lard, dripping, or olive oil. In place of a pan, the lid of a biscuit tin will serve to fry a piece of meat in.

Baking.—Baking is a favourite method of cooking in camps. A small piece of meat wrapped up in a few sheets of wet or greased paper, or in a complete coating of clay, say 12 inches thick, and put in the hot cinders

for 10 to 15 minutes, will be sufficiently baked. Birds and potatoes can be cooked in a similar manner. Small meat pies or pasties can also be cooked in hot ashes when covered with greased paper.

Boiling.—Meat plunged in boiling water has the albumin on the surface coagulated at once, and the meat juices are thereby kept in the meat. After immersion the heat is to be lowered to about 200° F. In this manner is a joint of meat boiled for table use. If the meat is put into cold water and the temperature gradually raised the juices of the meat are abstracted from the meat into the water in which it is being boiled; that is, soup is made, and the boiled beef cooked in this fashion is tasteless, and has but little nourishing quality.

Salt beef or pork should be well washed in cold water, then placed in a vessel with cold water which is raised to the boiling point and kept simmering for an hour, when the meat is removed and the water thrown away. The meat is again put into fresh cold water, and allowed to simmer gently until it is done.

Stewing.—When the temperature of the water in which the meat is being cooked is not allowed to rise above 180° F. (that is, 32 degrees below boiling point), the meat is said to be stewing; in other words, the meat is being gradually simmered. All tough parts of meat should be stewed, not boiled or roasted.

Vegetables.—All vegetables should be cleaned before being cooked, and the older, brown, or decayed parts of cabbages, greens, etc., should be removed. To remove insects, etc., from cabbages, dip the cabbages before cooking in salt and water (cold).

When vegetables are to be served separately: after cleaning, plunge them into boiling water with a little salt and soda, leave the lid off and boil quickly until tender (usually twenty minutes—cabbages longer), then remove from the water, strain, and serve hot.

PREPARATION OF FOOD

Stock.—In camp, stock should always be available for immediate use. Stock is the liquid in which meat and bones have been boiled. A stock-pot should be

constantly kept simmering by or over the fire, and scraps of bones, meat, gristle, etc., added from time to time, and cold water to supply the place of the water given off by evaporation. The scum and fat are skimmed off occasionally. At night the stock should not be allowed to stand in the stock-pot, but should be, while still hot, poured through a strainer (tin, hair, muslin, or coarse cloth) into a basin. When the stock is required for soup, turn it into a pot on the fire, add vegetables cut into pieces, let it simmer until the vegetables are cooked, season with salt, pepper, or mushroom ketchup. In making stock, the usual proportion is about 1 lb. of stock meat (beef, mutton, or veal) to 2 pints of cold water. The quantity of water is reduced to about half during the process of cooking, so that when prepared for consumption there is the "goodness" of 1 lb. of stock meat in 1 pint of soup.

Good Thick Soup.—To make 7 pints of soup, cut up 6 lb. of beef, or 3 lb. of beef and 3 lb. of veal, 3 onions, 3 small turnips, 3 carrots, a dozen allspice, and herbs, and put into a muslin bag with 10 pints of cold water. To thicken the soup, add 6 oz. of flour mixed smoothly with a little cold water, and stir into the soup a quarter of an hour before. Strained semolina (4 oz.) may be used instead of flour. It is wise to fry the meat in butter a quarter of an hour before putting it into the pot. Boil gently for 9 hours, and strain. This should make soup for 12 people.

Mutton Broth.—To make 7 pints, take 4 lb. of neck of mutton, 3 lb. 6 oz. of barley, 2 onions, 1 carrot, 1 small turnip, 2 teaspoonfuls of chopped parsley, 10 pints of water and 2 teaspoonfuls of salt. In addition, 1 leek and 2 or 3 leaves of celery may be added, if available. Cut the mutton into small pieces, simmer, skim, add the barley (washed) and herbs, let simmer for 1 hour and skim off fat frequently. Cut the vegetables into small pieces and add to the soup, and let it simmer for 1½ hours. Take out the herbs, add the salt, and pour into tureen on top of the parsley.

Ox-tail Soup.—To make 7 pints, take 1 large ox-tail, 3 lb. of shin of beef or 3 pints of stock, 2 onions, 2 carrots, a stick of celery, a little white pepper, spice,

and herbs, and 6 quarts of water. Allow to simmer for 5 or 6 hours, strain the soup; in a saucepan mix 4 oz. of flour and 3 oz. of butter, stir over the fire until brown, add the flour and butter to the soup, boil and simmer slowly for 15 minutes, skim, add the pieces of ox-tail previously strained off. The addition of a glass of sherry and a little lemon is an improvement.

Vegetable Soup.—To make 7 pints, take 2 carrots, 2 small turnips, 4 onions, 4 pieces of celery, a bunch of herbs, 4 oz. of fat, 5 tablespoonfuls of flour, 3 pints of water, 2 pints of white stock, 4 pints of milk, 2 teaspoonfuls of chopped parsley. Cut the vegetables into small pieces. Melt one half of the fat in a saucepan, and in it fry the vegetables for 7 minutes and turn out on to a plate. Fry the remainder of the fat and flour for 2 minutes (without colouring), pour in the stock and water and milk; boil; add the fried vegetables, and cook for half an hour, or until the vegetables are done. Remove the herbs, add the salt and parsley, and pour off into a tureen.

Chicken Broth.—Take 1 chicken and 2 pints of water. Cut the prepared chicken into small pieces, put it into the water with a little salt. The whole can be put into a large jar, which is covered over and stood in a saucepan of boiling water. Cook for 4 hours, strain, remove the fat, and season if necessary with celery and onion.

Potato Soup.—To make 7 pints, take 5 lb. of potatoes, 4 onions, 1 stick of celery, 2 quarts of stock or water, $2\frac{1}{2}$ quarts of milk, salt and pepper, a bunch of herbs, 4 oz. of bacon fat or butter, and 1 oz. of grated nutmeg. Slice the potatoes and onions, fry the onions in fat for 5 minutes without colouring, add potatoes, celery, herbs, and part of the milk. Put on the lid and allow to simmer until the potatoes are soft; take out the herbs, strain the soup, and, if too thick, add more milk.

Green Pea Soup.—To make 7 pints, take 2 quarts of peas, $\frac{1}{4}$ lb. of butter, 2 or 3 slices of ham, 6 onions chopped, 4 shredded lettuce leaves, 3 lumps of sugar, 7 pints of stock, 2 pints of water, 3 handfuls of spinach, salt. Fry the onions and ham in the butter, add peas, stock, and water, let simmer gently for forty-five minutes,

add the lettuce and sugar, let simmer for 20 minutes longer, bruise the spinach and wring in cloth, and add sufficient of this to turn the soup a green colour. It is improved in appearance if passed through a colander. Season with salt.

Barley Soup.—To make 7 pints, take 2 lb. of shin of beef (or stock), $\frac{1}{2}$ lb. of barley, 6 onions and 2 small turnips cut into small pieces, and 9 pints of water. Put in all the ingredients, and let simmer gently for 3 hours.

Five-minute Soup.—To make 1 pint, stir 3 teaspoonfuls of bovril, oxo, or other prepared beef extract, 2 teaspoonfuls of tomato ketchup in $1\frac{1}{2}$ pints of water, and bring to the boil. Add salt and pepper as required.

Shepherd's, Cottage, or Potato Pie.—For 12 persons, take 4 lb. of cold mutton or beef (or 4 lb. of tinned mutton or beef), 8 lb. of potatoes, 8 oz. of butter, 8 onions, a little sauce, milk, seasoning, and bread crumbs. Boil the potatoes soft, mash them with a little milk and butter, cut the meat into small pieces, slice the onions, and fry them in mutton fat. Butter a pie-dish, place in it a layer of meat, with seasoning and onions, then a layer of potatoes, again a layer of meat, etc., and a layer of potatoes until the pie-dish is full. Spread a thin layer of potatoes over the top and a few bread crumbs and bake for 20 minutes.

Collops of Beef (Minced Beef).—For 12 persons, take $4\frac{1}{2}$ lb. of steak, 4 onions, 6 oz. of butter, 2 tablespoonfuls of flour, 10 oz. of water, ketchup, toast, pepper and salt. Mince the meat and onions and fry them in the butter until the meat browns, stir in the flour and then the water, keep stirring and let simmer slowly for half an hour; add the condiments. Turn out on to the dish and garnish with bits of toast.

Irish Stew.—For 12 persons, take 5 lb. of neck of mutton, 7 lb. of potatoes, 12 onions, 4 pints of water, with herbs, chopped parsley, pepper and salt. Cut the mutton into small pieces and the onions into quarters, place both in the saucepan, add water to cover the meat and the herbs, place the potatoes (whole) on top, sprinkle with pepper and salt, and allow the whole to simmer for $2\frac{1}{2}$ hours. Place the potatoes in a suitable dish to form a nest, and, after

removing the herbs, turn out the stew into the centre of the potato nest and sprinkle parsley over.

Sea Pie.—For 12 persons, use the same quantities as for Irish stew. For the pudding on the top of the pie, use $2\frac{1}{2}$ lb. of flour and $1\frac{1}{4}$ lb. of suet.

Haricot Mutton.—For 12 persons, take 6 lb. of mutton, 8 onions, 3 carrots, 3 small turnips, 6 tablespoonfuls of flour, $3\frac{1}{2}$ pints of water, with herbs, pepper and salt. Cut the mutton into pieces and fry it brown in saucepan; fry the onions in fat or butter in another saucepan and add them to the meat; fry the flour in onion fat, add water, and stir until boiling, then pour it on to the mutton and onions, add the herbs, let all simmer gently, after 1 hour put in the carrots and turnips cut small, and let simmer for another $1\frac{1}{2}$ hours. Take out the herbs, skim, add pepper and salt. Cooked green peas or beans or haricot beans may be added.

Stewed Steak.—For 12 persons, take $5\frac{1}{2}$ lb. of steak, 10 onions, 3 carrots, 3 small turnips, 6 tablespoonfuls of flour, 4 oz. of fat, with herbs and pepper and salt to taste. Cut the steak into 12 pieces, fry quickly in a little fat on both sides, fry the onions in same pan and turn them out with the meat, fry the flour with the remainder of the fat, add the water, and stir until it boils. Put the meat and onions back in the pan, add the herbs, let all simmer gently for an hour, then add carrots and turnips cut into slices, and let simmer for 2 hours longer, take out the herbs, and season with pepper and salt.

Stewed Steak and Macaroni.—For 12 persons, cook the steak and onions as for stewed steak, using 5 lb. of steak and 1 carrot; boil $1\frac{1}{2}$ lb. of macaroni in water with 3 teaspoonfuls of salt, strain, cut the macaroni into 2-inch lengths, and serve it round the steak.

Stewed Steak and Dumplings.—For 12 persons, use and cook the same ingredients as for stewed steak. For the dumplings take 1 lb. flour, $\frac{1}{2}$ lb. of chopped suet, 1 teaspoonful of salt. Mix these ingredients with cold water sufficient to form paste, divide into 24 portions, roll these out smoothly, and put in with the steak for the last hour to cook.

Steak-and-Kidney Pie.—For 12 persons, take 4 lb.

of steak, 1 lb. of kidney, $1\frac{1}{2}$ teaspoonfuls of flour, 3 teaspoonfuls of salt, 1 of pepper and 4 of chopped parsley. For the pastry, 2 lb. of flour, 1 lb. of dripping or lard, 1 teaspoonful of salt, and cold water sufficient to mix into paste will be required. Cut the steak and kidneys into small pieces, mix these with the flour, add the seasoning, and turn into a pie-dish three parts full of water. Cover the pastry and bake for 2 hours.

Steak-and-Kidney Pudding.—The ingredients are the same as for steak-and-kidney pie. Instead of making the pastry, prepare a suet crust as follows: Take 3 lb. of flour, $1\frac{1}{2}$ lb. of chopped suet, $1\frac{1}{2}$ teaspoonfuls of salt and water. When all is mixed together into a paste, line 2 greased basins with three parts of the paste. Turn the meat, etc. (prepared as for steak-and-kidney pie), into the dishes, fill up with water, and cover all over with the remainder of the paste, tie cloths over the tops of the basins, and boil for 5 hours.

Yorkshire Pudding.—For 12 persons, take $1\frac{1}{2}$ lb. of flour, 3 eggs, 3 pints of milk, 8 oz. of dripping, $1\frac{1}{2}$ teaspoonfuls of salt. Mix the flour, eggs, and salt with some of the milk into a smooth batter, add the remainder of the milk, stir well, and let stand for half an hour. Make the fat hot in tins 2 inches deep; pour in the batter and bake in moderately hot oven for about three quarters of an hour.

Yorkshire pudding may be served as a "sweet" with jam, treacle, or sugar sprinkled over it. Or $\frac{1}{2}$ lb. of sultanas or stoned raisins may be put in the batter before cooking, also $\frac{1}{2}$ lb. of sugar and a little nutmeg.

Toad-in-the-Hole.—For 12 persons, take ingredients as for Yorkshire pudding, with, in addition, $4\frac{1}{2}$ lb. of steak or mutton, and pepper and salt. Cut the meat into $\frac{1}{2}$ -inch squares, lay these in a well-greased pie-dish, sprinkle with pepper and salt, pour batter (as above) over this, and bake for $1\frac{1}{2}$ hours. Instead of meat, 4 lb. of sausages cut up into pieces may be used, or cold cooked meat may be substituted for the fresh meat.

Kedgerree.—For 12 persons, take 4 lb. of cold fish, 4 breakfastcupfuls of boiled rice, 8 oz. of butter, 1 teaspoonful of mustard, 8 hard-boiled eggs, with nut-

meg and salt to taste. Clear the skin and bones from the fish, tear the fish to pieces with forks, chop 4 of the eggs and mix with the other ingredients ; melt butter in the saucepan, add ingredients, and stir over the fire with a fork until the mass is well heated, then turn out on dish, and garnish with the 4 remaining eggs cut up into pieces, and chopped parsley on top.

Marmalade Pudding.—For 12 persons, take 1 lb. of bread crumbs, 4 oz. of flour, $\frac{1}{4}$ lb. of brown sugar, $\frac{3}{4}$ lb. of chopped suet, 1 lb. of marmalade, 1 pint of milk, 4 eggs, 3 teaspoonfuls of baking-powder, a pinch of salt. Mix the dry ingredients together, and the eggs well beaten, and the milk ; pour out into 3 greased basins or tins, and steam for 2 hours ; warm the 1 lb. jar of marmalade with a pint of water, and pour over the pudding when turned out.

Lemon Pudding.—The ingredients are the same as for marmalade pudding, but substitute the grated rind of $1\frac{1}{2}$ lemons and juice of 2 lemons for the marmalade, and add $\frac{3}{4}$ lb. of sugar.

Bread-and-Butter Pudding.—For 4 people, take slices of bread and butter, 1 tablespoonful of sultanas, 1 tablespoonful of castor sugar, 2 eggs, 1 pint of milk, some peel and nutmeg. Butter a medium-sized pie-dish, placing some peel and sultanas on the bottom of the dish ; lay the slices of bread and butter in layers with some sultanas between ; beat up the eggs, milk, sugar, and nutmeg together and pour into the dish ; let the pudding stand for 20 minutes before placing it in the oven, where it remains for 20 minutes, or until it sets and colours on the top.

CHAPTER XIX

AMBULANCE ORGANISATION IN THE FIELD

It is difficult to bring home to the people of Great Britain that there is a possibility of the country being invaded. It is, however, often spoken of by ourselves and by people of other countries, and it has actually been successfully carried out on more than one occasion in days gone by. As the Voluntary Aid Detachments



Fig. 127.—Supposed battlefield around Colchester.

General hospitals are indicated, four in London, one in Cambridge. Sea-coast towns are indicated where ships may be obtained. The broad dark lines are railways, the narrow lines are roads.

are intended for work at home, we will assume that invaders have landed at, say, Colchester, in Essex,



Fig. 128.—Towns at which General Military Base Hospitals exist ; the figures show the number of hospitals at each centre.

and have established their base in that town. Their next move we will assume to be an advance in force towards London. Outside Colchester they are met by

a defending force, who not only prevent the enemy from advancing, but drive them back and retake the town. The enemy in their retreat are followed by the attacking force, and with the force the Field Ambulances advance, leaving their sick and wounded to be

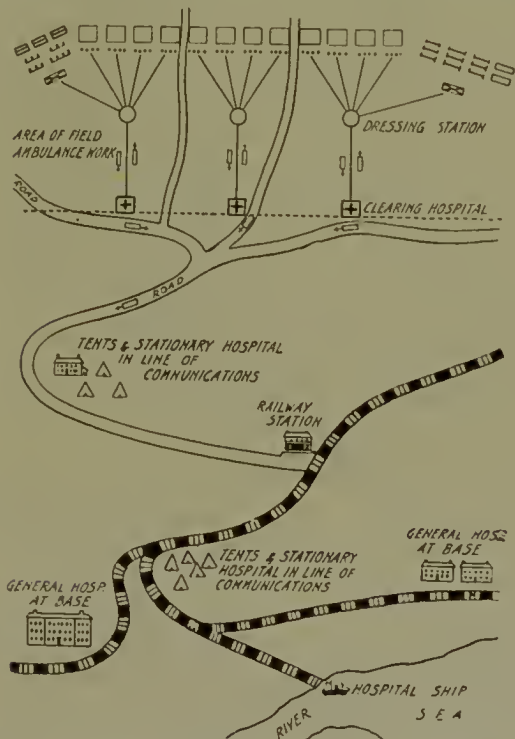


Fig. 129.—Diagram showing Division in position, with lines of transport of wounded from front to base.

cared for by the V.A.D. In all probability the enemy in their hurried retreat would leave many of their more seriously wounded behind, so that, if the engagement was a severe one, the wounded would be many and the work of the V.A.D. heavy.

Clearing the front of sick and wounded is the primary work of the Medical Department of an army in action. It is the duty of the R.A.M.C. Field Ambulances to clear the front, a duty in which the V.A.D. can assist, and help to free the advanced hospitals as speedily as possible by sending to the rear all soldiers capable of being moved. The destination of the majority of the wounded will be the nearest General Military Hospital at the base. Colchester being the scene of the fight, the nearest base hospitals are at London and Cambridge, and a study of the small sketch map (Fig. 127) shows the railway and road communications between Colchester and London, where there are four General Hospitals, and between Colchester and Cambridge, where there is one.

Fig. 128 gives the outlines of a map of Great Britain, showing where the General Hospitals are located, and the number of hospitals in each instance.

A sketch of a Division of troops with the lines of communication for medical requirements is given (Fig. 130) to enable the members of V.A.D. to understand how ambulance work is organised in war.

A division of troops is supposed to be at the front. A division consists of three brigades of four battalions (regiments). In the diagram these brigades are advancing and keeping in touch with two main roads. On either flank are corps troops, consisting of cavalry, artillery, ammunition columns, &c.

Fig. 130 illustrates the medical organisation of one of these brigades and of the four battalions of which each brigade is composed. R.B. represents the **Regimental Stretcher Bearers**—two per company. These men (often trained handsmen) move forward with the regiment after attending to the more severe injuries of the wounded, especially as regards arrest of hæmorrhage; they have a badge with S.B. (stretcher bearers) on their left arm. To each battalion a Medical Officer (one or more) is attached, who moves forward with the battalion; on this officer 5 medical orderlies (R.A.M.C.) are in attendance, and it is their duty to co-operate with and supplement the work of the regimental stretcher bearers.

The regimental stretcher bearers are constantly in touch with the Field Ambulance, by which the work of carrying stretchers, assisting wounded men, or directing the wounded who can walk to the Dressing Station, is taken up.

The medical store cart and water cart move along with the Medical Officer and orderlies. With the carts are two drivers. The medical cart contains medical equipment such as stretchers, blankets, surgical haversacks and field companions, medical comforts, and a Red Cross flag.

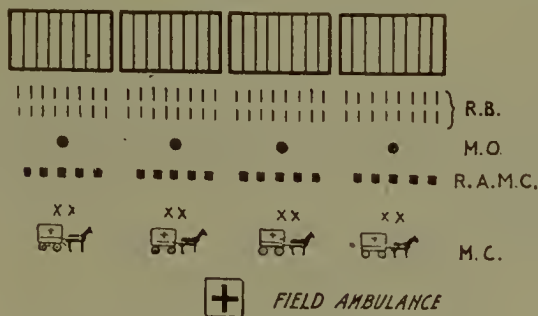


Fig. 130.—Diagram showing medical personnel and equipment of a brigade of four battalions.

R.B., Regimental stretcher bearers; M.O., Medical officers; R.A.M.C., Five men attached to the M.O.; M.C., Medical carts; XX, Drivers.

The **Dressing Station** is the principal focus towards which all the wounded are conveyed from the front, but as the front is continually changing, more advanced focal points may be required, termed either Subdivision or Advanced Dressing Stations; these serve as Collecting Stations or rallying points for the wounded.

As soon as an engagement develops, a Field Ambulance attached to a fighting force halts some 2,000 yards behind the firing line, and sends forward as many officers, bearers, and waggons as may be required. After advancing, say, 1,000 yards, the officer in command forms

a Dressing Station, marking the position by flags, and then proceeds to break up the force into smaller bodies, each under a Medical Officer. The separate bodies advance to within a few hundred yards (say, 300 to 500) of the firing line, and the officer in command establishes an Advanced Dressing Station, marked by a Red Cross flag, to which point ambulance waggons advance. The nearest ambulance waggon will be the focus towards which stretcher bearers will converge.

ADVANCED DRESSING STATIONS

The Advanced Dressing Stations (for many are required if the fighting line is widespread) should be placed as close to the firing line as shelter and comparative safety from bullet or shell fire permits. In practice during peace 500 yards is usually fixed upon, but during an engagement the almost constant change of position of the front line, and many other circumstances, render exact distances impossible to settle definitely.

At the Advanced Dressing Stations are :

- A Medical Officer in charge.
- Bearers with their stretchers.
- Ambulance waggons and water cart.
- Field companion.

Although under cover, the Advanced Dressing Station should not be hidden away in the heart of a thicket or deep in a wood, for wounded soldiers who can walk without help, and stragglers from the front, would have difficulty in finding it. Even the bearers might find it difficult in a closely wooded district to retrace their steps, or to remember the way they came. As soon as the ambulance arrives at the place where wounded are collected, the waggons are turned with the horses' heads to the rear, so that the tail end of the waggon is readily reached by the bearers with their loaded stretchers. The Medical Officer in charge of the station now proceeds to send out stretcher squads in whatever directions are indicated, telling No. 4 of each stretcher squad to get in touch with the regimental stretcher bearers, take over the wounded from them, examine the first-aid treatment

already applied, see that it is properly adjusted, render first aid where it has not been already given, and then to direct or to carry the wounded to the Dressing Station.

When a soldier during an engagement falls out, (1) if able to walk by himself he should be directed to a Dressing Station: (2) if able to walk with support he should be helped by one bearer to a Dressing Station: (3) if unable to walk he may be conveyed by two bearers by a hand seat, or otherwise carried; (4) if he is seriously injured he must be placed upon a stretcher and carried to the Dressing Station: (5) if killed, the body may be allowed to lie until the stress of the engagement is over before it is removed for burial.

At the Dressing Station the wounded man, if but slightly injured, should, if he can walk, be directed or helped to the Clearing Hospital. If seriously injured, he should be seen by the Medical Officer in charge of the Dressing Station, and after being attended to should be carried on a stretcher or placed in an ambulance waggon and conveyed to the Main Dressing Station or the Clearing Hospital. When a soldier is but slightly wounded he should be requisitioned to help his more seriously wounded comrades, either by rendering first aid if he can, or by helping or directing them towards the Dressing Station, or administering water, medical comforts, &c.

The Dressing Station is chosen (*a*) as far forward as is consistent with safety; (*b*) where it is accessible to ambulance waggons; (*c*) where a good supply of water is obtainable; (*d*) where horses can be watered and fed. If the patients cannot be "housed" in tents, the buildings chosen should be as hygienic as possible. At the Dressing Station the wounded are treated, if necessary an operating tent is erected, and all the details of a temporary hospital are carried on.

As soon as possible, however, the wounded are conveyed by road in waggons to the Clearing Hospital, where as near an approach as possible to a fully-equipped hospital of 200 beds is set up. The wounded are accommodated in a hospital encampment of tents, or housed in appropriate dwellings.

The further conveyance of the wounded to the base

in the Regular Army, is carried out by the Medical Department of the Army, but in the Territorial Force there is no such provision, and it is at this point, namely, from the Clearing Hospital, that the work of the Voluntary Aid Detachments commences.

THE FIELD AMBULANCE

To each Division of an army three Field Ambulances are attached, that is, one Field Ambulance to each of the three brigades of which the Division is composed.

In Fig. 131, a Field Ambulance, with its personnel and equipment, is represented drawn up in line.

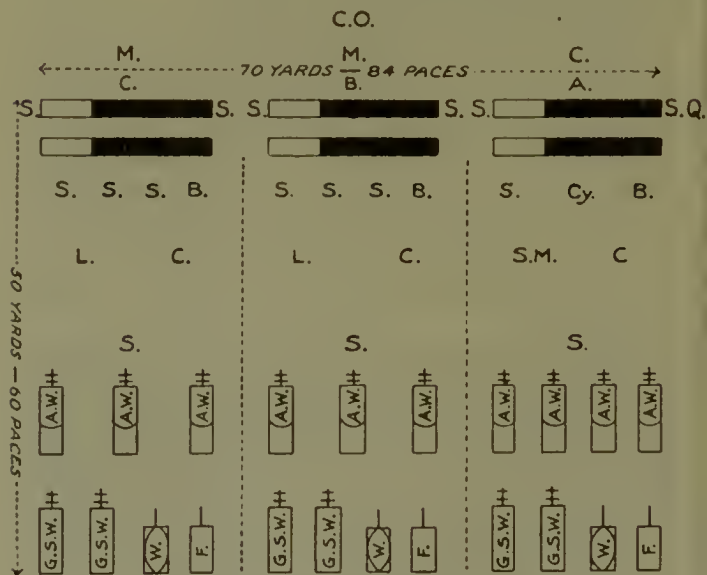


Fig. 131.—Field Ambulance in line.

A B C, sections; C.O., Commanding Officer; M., Majors; C. and L., Captains and Lieutenants; Q., Quartermaster; B., Buglers; S., Sergeants or Staff Sergeants; S.M., Sergeant-Major; on the flanks of the front rank of each section one sergeant or staff sergeant is posted as section commander; these are not indicated in diagram; Cy., Cylist Orderly; A.W., Ambulance Waggons; G.S.W., General Service Waggons; W., Water Carts; F., Forage Carts.

A **Field Ambulance** consists of three sections, A, B, C, each section being capable of acting independently. Each section comprises (a) a Bearer subdivision (represented dark in diagram), numbering two-thirds of the section; (b) a Tent subdivision (light in diagram) amounting to one-third of the section. In command of the whole is the Commanding Officer (C.O.). In command of each section is a Field Officer, a Major (M.). No major is attached to section A, the C.O. taking charge when it acts independently. The disposition of officers and sergeants will be understood from the diagram.

The ambulance waggons (A.W.) are drawn up in rear of the sections, four waggons with A section and three waggons each with B and C. To each section are posted two general service waggons (G.S.W.), one water cart (W.), and one forage cart (F.). The waggons are drawn by two, four, or six horses, according to the nature of the roads.

The total number of officers and men in a Field Ambulance of the Regular Army is 251, exclusive of transport personnel. In the Territorial Force the strength of a Field Ambulance is 229, including the transport personnel.

ARRIVAL OF VOLUNTARY AID DETACHMENT AT SEAT OF ACTION

A Voluntary Aid Detachment, on arriving at the scene of military operations, has, under the direction of the Medical Officer R.A.M.C., to help in the care of the sick and wounded from that portion of the Field Ambulance in its immediate front.

The conditions met with on arrival may vary considerably, as follows:—

1. Wounded Housed.—The Field Ambulance may have quartered the sick and wounded in public buildings, such as schools, halls, or barns. This renders the task of the Voluntary Aid Detachment comparatively light, as at least shelter has already been found for those about to come under their care.

2. Wounded in Tents.—The Field Ambulance may have pitched a Field Ambulance encampment where the

sick and wounded have been accommodated in tents. The departure of the army necessitates, however, that the Field Ambulance move away also, when the tents are struck and all waggons, stretchers, tents, and medical equipment are taken away with the departing Field Ambulance, and the work of obtaining shelter for the patients in public buildings, or of erecting temporary shelter, has to be carried out by Voluntary Aid Detachments. This is an arduous task, and one that calls upon the energies and organising powers of the members of the detachments in a superlative degree.

3. Wounded in the Open at Dressing Station.—The Field Ambulance may have had no time to do more than form a Dressing Station, when the Voluntary Aid Detachments have to take over the wounded in a condition requiring a great amount of surgical care. In addition, they are responsible for the formation of a temporary hospital and all the details of providing shelter, food, distribution and transportation of the sick and wounded.

Commandant's Primary Duty.—When a Voluntary Aid Detachment comes into touch with a Field Ambulance in war or during manœuvres, the Commandant of the Voluntary Aid Detachment must report himself to the officer in command of the Field Ambulance. He will ascertain from the officer in charge the approximate number of casualties, where they are disposed, and, if time allows, the Medical Officer of the V.A.D. will visit the more seriously wounded with the Field Ambulance (R.A.M.C.T.) Medical Officer and become acquainted with the nature of the injuries, the operations that have been performed, and the probable treatment still required. An orderly attached to the Commandant V.A.D. will take notes of the most important points elicited during this round of visits.

Quartermaster's Primary Duty.—The Quartermaster of the V.A.D. should accompany the Commandant on his round, (a) taking note of the accommodation already provided, (b) observing what further accommodation may be required, and (c) gauging the number of sick and wounded so that approximately

he may ascertain the amount of food required, etc. The Quartermaster should be accompanied by an orderly to take notes of the requirements.

Formation of Headquarters.—When this preliminary round of inspection has been made, the Commandant selects a convenient spot for his headquarters, and marks it by a flag or by a notice board, or, if neither be available, informs the officers in his command where the headquarters are. These officers in turn hand on the information to the under officers, and so to the men and women serving in the detachment. The headquarters, if in a village, may be at a commodious private house, the village school, village hall, or church room; if in the open country, at the nearest farmhouse. If, however, the village or farmhouse is too far away from the field of battle, the headquarters must be established in a specially selected field, near a clump of trees, beside a cart, a haystack, or at any distinctive spot readily seen and reached.

Apportionment of Duty.—The Commandant next allocates the work to the Medical Officers of his detachment. If the patients are distributed over a fairly wide area, one Medical Officer, with the stretcher detachments under his command, will be told off to attend to bringing in the casualties—say on the right of the field, and another will take charge of the left area.

Available Accommodation.—The Assistant Commandant will now be left in charge of the headquarters, while the Commandant and Quartermaster, with orderlies, together survey the immediate neighbourhood to ascertain what further accommodation is available. If in a small town or village, the available quarters will be examined, and their capacity and suitability noted. The position of the water supply of the village will determine where the cook-house or kitchen is to be placed, for the two must be as near as possible.

In this preliminary round, inquiries should be made where milk may be had, and what stores of bread and groceries are available. The position of the telegraph office and of the nearest railway station should also be ascertained, and such other information obtained as may be deemed useful and requisite.

Floor and Cubic Space required for housing Wounded.—In choosing quarters in public buildings, barns, etc., at least the floor space should be ascertained. In order to gain an approximate idea of how many persons can be accommodated in any given building, each room may be measured by pacing the floor, counting an extra-long step to measure a yard. Supposing the floor space of the village school to measure 20 paces by 12 paces, that is 20 yards by 12 yards, or 60 feet by 36 feet, the area of the apartment will equal $60 \times 36 = 2,160$ square feet. In this room, allowing about 90 square feet to each patient, 24 or 25 patients

may be placed. To ascertain the size (cubic capacity) of a room, the measurements are easily made. The rule is to multiply the length by the breadth by the height of the room. Suppose a room to be 10 feet one way (length) and 10 feet across (breadth) $10 \times 10 = 100$ square feet (Fig. 133). Allowing now the room to be 10 feet high, then $10 \times 10 = 100$ (square feet) $\times 10$ (height) =

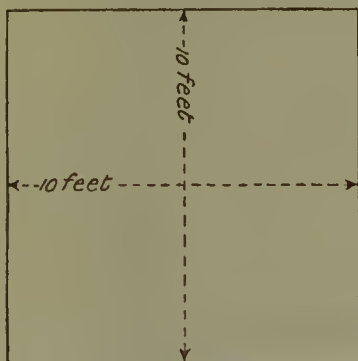


Fig. 133.—To measure floor space of room.

1,000 cubic feet (Fig. 134). Now 1,000 cubic feet is theoretically the amount of air space necessary for health for each patient in a hospital ward. Less than this must at times of stress suffice in hospital—say, after a severe engagement, but it is well to keep the regulation amount required constantly before one.

An intelligent V.A.D. man should be sent round to measure quickly the available buildings in the village, and when he has gauged the size of an apartment or building and decided upon the number of patients that can be accommodated, he should chalk the number on the door as he proceeds on his rounds. He must keep

a note of the various observations he has made, and report the results of his investigations to his under officers, or directly to headquarters. In this way a rough estimate can be formed of the "housing" possibilities and capabilities of the village or its immediate environment.

Floor Space more important than Height of Apartment.—In estimating how many beds can be placed in a given apartment, it must be remembered

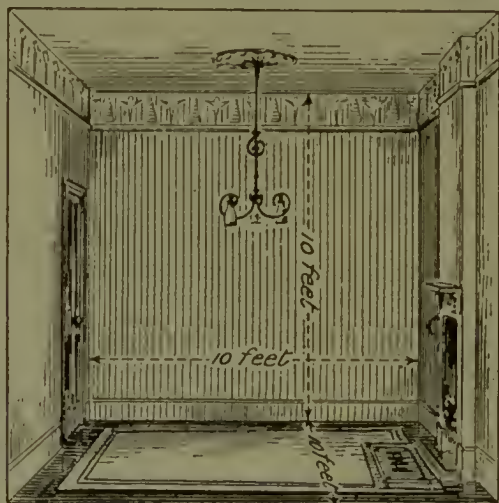


Fig. 134.—Ascertaining cubic (air) capacity of a room by measuring height, breadth, and length.

that the height of a building does not compensate for insufficient floor space; in other words, although the height of a barn or schoolroom be 30 feet from floor to ceiling, that does not compensate for deficiency in other directions. The reason of this is that the products of respiration are not readily diffused throughout the air of an apartment, but tend to accumulate in the lower strata, consequently excessive height, in fact anything over 14 feet, is inefficacious in securing purity of air in the apartment, although the total cubic space

allotted to each individual may, by multiplying the length by the breadth by the height of the room, seem to be theoretically correct. Thus it is not the same thing to allow a man 50 square feet of floor space in a room 20 feet high as to provide 100 square feet in a room 10 feet high, although the cubic space would be the same. In other words, the amount of floor space to each individual bed is the important item.

Hygienic State of Building determines the Kind of Case to be located there.—There are several additional observations of value which should be noted. Should a barn, cart shed, or stable be one of the places required for accommodation of the patients, a note should be made (1) whether the floor is of earth, concrete, brick or wood; (2) whether the roof is watertight, or the floor damp; (3) whether the building is clean; (4) if there are any rat holes about; (5) what light there is; (6) if ventilation is possible or sufficient; for the condition of the building will determine the kind of case sent to it, the more hygienic quarters being reserved for the serious surgical cases.

Billeting.—It may be possible to place (billet) some of the sick and wounded in private houses near headquarters. The most seriously injured should be placed in the best quarters from a hygienic point of view, for though the cottagers may be kindly and willing to offer their rooms, their houses are at times not suitable for patients with serious wounds or after operations. The Quartermaster, if he cannot go himself, will select the most tactful man of his detachment to visit the houses and inquire as to billeting, for it is a matter of interviewing and conciliating, and at times there are difficulties to be overcome in regard both to acceptances and refusals of quarters offered. The names of the occupants of the houses, the position of the house, and the number possible to accommodate, and whether the patients are to be both lodged and boarded or lodged only, must all be noted and reported. The question whether board can be obtained as well as lodgings is important, for, if the patients cannot be fed at their lodgings, food must be supplied from headquarters; of this matter the Quartermaster's staff must take and keep careful note.

A Bivouac.—Lying on the bare ground in the open in Britain is fraught with danger owing to the dampness of the ground, hence in almost all military manœuvres a waterproof sheet is carried in the regimental transport. But in war this “luxury” is seldom to hand, and the bare ground, wet or dry, must suffice. When the ground is sandy, a fairly comfortable rest can be got if the sand is scooped out by the hands to a sufficient depth just where the hips come whilst one is lying. It must not be scooped out too deeply, or discomfort will be the result. The sand can also be heaped together for a pillow and covered with any material to hand. If the ground is of loam a hollow for the hips may also be scooped out with the hands or by the help of a stick or knife. If the soil is stiff clay it may be necessary to scoop a place for the hips with a shovel.

Warming a Bivouac.—When the ground is damp and cold an old campaigner will, when possible, get some of the hot ashes from the cook-house or camp fire and throw them on the hole scooped out for the hips; or he will place paper, sticks, leaves, &c., in the hole, and set fire to them (if such is not forbidden by military exigencies). The ashes, after heating the ground, are scattered or passed on to a neighbour, or covered with a layer of dry sand or earth on which the man can lie. It is wonderful how warm a bivouac keeps when this plan of warming the hole scooped out for the hips is followed.

CHAPTER XX

TRANSPORT BY RAIL

REMOVING sick and wounded from the Clearing Hospitals to the base is largely the duty of the Voluntary Aid Detachments when acting with the Territorial Force. For the evacuation of the hospitals at the front, every mode of transport and carriage must be taken advantage of, country carts and waggons being subsidised for the purpose, and all local help secured, in the way of men able and willing to carry stretchers under supervision, to act as drivers, and generally assist the V.A.D.

If the journey to the nearest railway station is long, it may be necessary to institute **Stationary Hospitals** in any public building, or even in sheltered places in fine weather. These Stationary Hospitals are intended as rest houses for cases too ill to be moved farther without danger, or when the railway is blocked, making it impossible to get the sick and wounded farther on the journey to the base.

The Stationary Hospitals in the regular army may consist of a field encampment, with all the personnel and equipment of a temporary hospital, of some 250 beds. In the work of the V.A.D., however, these Stationary Hospitals should be established in villages or around large farm dwellings where shelter and provisions may be obtained. (Fig. 129.)

At the railway station a Stationary Hospital is often required, as there may be delay before it is possible to entrain the sick and wounded. Also, at any junction on the railway a Stationary Hospital may be of advantage.

The waggons, regulation or improvised, convey the sick and wounded from the Clearing Hospital at the front to the railways, where the wounded are placed in carriages equipped as hospital trains, or, what is

more likely to be available in this country, ordinary passenger carriages, milk and fruit trucks, covered carriage trucks, etc.

RAILWAY WAGGONS

Railway covered waggons vary in size as regards length. The width inside is on an average 7 feet 6 inches, whilst the length may be anything from 30 to 50 feet or over. The doors are on both sides in the centre of the waggon, and in many cases, such as fruit, milk and carriage waggons, at both ends as well.

To fit up a railway waggon by **Zavodovski's method** the regulation requirements will seldom be at hand for Voluntary Aid Detachments. It is necessary, however, in this, as in all other military work, to become acquainted with the official methods, so that when they have to be improvised the "standard" may still be aimed at.

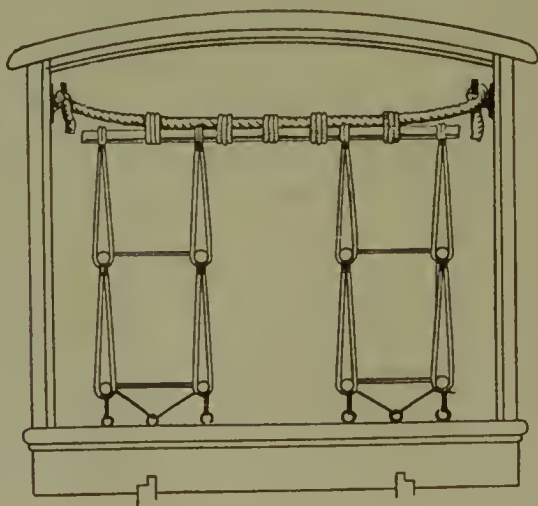


Fig. 135.—Zavodovski's method of fitting up a railway waggon with modified cables and lashings, when cables with ringed ends cannot be had (*see text*).

For Zavodovski's method the following articles are required :—

(1) 4 cables in length equal to width of waggon, and over 1 inch thick, ringed at each end; (2) 16 stout looped ropes (the thickness of a drag-rope) tied in the centre so as to support the upper tier of stretchers; (3) 8 large iron hooks; (4) 32 small ring-bolts; (5) 4 solid circular poles, 6 feet long and 2 inches thick; (6) 8 stretchers; (7) 28 stout cords for lashings.

The above materials are fixed as follows :—

Two hooks are fixed on the beam of the door on either side, 3 feet apart from each other and 1 foot to the inner side of the edge of the door-bolts. The remaining four hooks are fixed at the same height, two at each side of the waggon opposite each other, and 1 foot from the end of the vehicle. The four cables rest on these hooks, the centre of the cable is firmly fixed to the centre of the pole. The sixteen loops are attached, four to each pole, to support the eight stretchers, and are looped on to the poles by passing one end through the other. Twenty-four ring-bolts are fixed in the floor, six under each pole, one beneath each end of the pole, the remainder 9 inches apart, but arranged so as to leave 2 feet in the centre. Four ring-bolts are fixed opposite each end of the end poles, half way up and into the side of the waggon. Four ring-bolts are fixed immediately on the inner side of the hooks on the beam above the doors. The twenty-eight cord lashings are fixed thus: the twenty-four cords, 5 feet long, are fastened to the ring-bolts in the floor; two cords, 12 feet long, are fastened to the ring-bolts above the door; two cords, 12 feet long, are fastened to the ring-bolts at the end of the poles.

The sides of the fruit and milk carriages are in many instances ventilated by the louver method, a great advantage in case of carrying wounded.

The details given above for fitting up a railway waggon for the transport of loaded stretchers by Zavodovski's method may not be possible to carry out, owing either to the materials not being at hand or to there being no time to accomplish it. In such an event the stretchers must be placed on the floor of the

waggon, and bearers may be told off to steady the stretchers, or boxes, &c., may be placed between the stretchers, or the stretchers be lashed to any convenient point.

If stretchers are not available on account of their being again required at the front, the wounded may be placed on straw or hay tied together in such a fashion as to provide a bed; or if sacks can be had, they should be filled (not packed) with straw or hay and laid on the floor, two sacks being used for each man, with the end of one inserted into the other (*see* Fig. 105); or three sacks may be laid with the long sides touching, and a bed for two men thus provided, the patients lying crosswise to the length of the sacks. Loose straw or hay makes a most satisfactory bed, but is more liable to take fire.

In the absence of the prepared ropes, hooks, etc., hooks of any shape may be fitted to the side of the van, provided they are strong enough, and the cables with prepared ringed ends may be replaced by ropes (doubled or quadrupled if necessary) passed from side to side over the hooks (Fig. 135). For poles may be substituted clothes' props, cricket net poles, fork handles, or any piece of timber cut to proper length, and lashed at several points to the cross ropes. The iron rings on the floor may be replaced by clothes hooks with screws such as are used in wardrobes, it being left to the ingenuity of the bearers to improvise any substitutes that may be strong enough to bear the strain placed upon them.

Another method where hooks cannot be obtained is to place stout poles across the interior of the waggon, supported by blocks of wood fastened to the sides at points corresponding to where the hooks are inserted in the regulation method. In the upper surface of the blocks a groove should be made when possible, to accommodate the ends of the poles, or the poles may be kept in place by nails driven into the side of the carriage above the block on either side of the pole end; from these poles the stretchers may be slung either by ropes or by the stretcher slings, on the same principles as in the regulation method.

RAILWAY WAGGON DRILL

The principles of loading and unloading railway waggons follow closely those given for Ambulance Waggon Drill. Only the prominent points that are peculiar to Railway Waggon Drill will be explained here.

LOADING

The squads are drawn up ten paces from and facing the waggon (less than ten paces on a narrow platform), with lowered loaded stretchers and fixed slings. The squads in succession from the right load waggons. No. 4 assumes charge of his squad, and gives the following words of command :—

“Squad — Load Waggon.”—This is done as in Ambulance Waggon Drill. All the four bearers lift the stretcher, advance by the nearest way to the waggon, wheeling when opposite to and one pace from the doorway. The stretcher is carried into the waggon head foremost, the first stretcher being conveyed to the far right-hand corner, where it is raised and laid in the upper loops of the ropes as they hang from the cross beams. No. 2 squad load the upper near right-hand corner and sling the stretcher in the upper loops. No. 3 squad place their stretcher in the lower loops at the near right-hand corner of the waggon. Each of these squads, as soon as they have placed the stretcher in position, leave the waggon, “fall in” facing the waggon, and wheeling to the right, take up position so as to be clear of the loaded stretchers waiting to be entrained. No. 4 squad now load the far lower right-hand corner, and proceed to fix the lashings as follows: The lashing to the lateral rings in the floor of the waggon immediately beneath the handles of the stretcher is carried up round the handle, back through the ring, and tied. The lashing attached to the central ring on the floor lying between the handles is passed up round the left handle, back through the ring and round the right handle, and so back to the central ring, forming a V when it is tied. The upper tiers are steadied by lashings starting from a ring-bolt in the side of the waggon, which are carried across and secured

to the opposite side, a hitch being taken round each handle. When drawn tight these side lashings prevent swaying.

The left half of the waggon is loaded in a similar manner, and can be carried out whilst No. 4 squad fix the lashings of the right hand, thereby saving time.

UNLOADING

Squads in succession from the left unload, commencing with the last stretcher loaded in the waggon, and the stretchers being removed in reverse order to loading. The squads are drawn up ten (or fewer) paces from the waggon. No. 4 takes charge and gives the command.

"No. (-) Squad—Attention—For Unloading—Take Post."—The squad named advance to the waggon, halting one pace from the doorway, Nos. 1, 2 and 3 stepping short to allow No. 4 to come up and place himself on the right of No. 1; No. 4 now takes a pace of 30 inches to the right to allow room for Nos. 2 and 3 to enter the waggon by passing up between Nos. 1 and 4. Nos. 2 and 3 now proceed to the head of the stretcher, No. 3 being on the left-hand side of the stretcher, and No. 2 on the right. Nos. 1 and 4 proceed to the foot, No. 1 on the left and No. 4 on the right. The lower stretchers are freed from the underneath lashing, lifted from the loops and carried clear of the waggon to the ground selected, and lowered, when the bearers stand to stretchers as in prepared stretchers. In removing the upper stretchers the side lashings must be freed first.

RAILWAY PASSENGER-CARRIAGES

Corridor carriages are unsuitable for lying-down cases, owing to the narrowness of the compartments; but they suit well for cases fit to sit up. Some first-class carriages (not corridor), owing to the arms being fixed between the seats, cannot be used for lying-down cases, but seats with movable arms are convenient and comfortable. Third- and second-class carriages (not corridor) are, however, suitable for lying-down cases. Improvised stretchers of the kind referred to

at p. 46 can be laid on the seats and fixed in their places (*see* Fig. 136).

The dimensions of a third- (or second-) class (non-corridor) carriage are :—

Width of doorway, 1 foot 10 to 11 $\frac{1}{4}$ inches.

Length of seat, 7 feet 4 inches.

Width of seat, 1 foot 6 to 7 inches.

Distance from back of seat to back of seat (that is, cross width of carriage), 5 feet 6 inches.

Distance from seat to rack, 4 feet 3 inches.

In a carriage of this size an improvised rope stretcher with poles, measuring not over 7 feet long and not more than 1 foot 10 inches broad can be accommodated.

When the stretcher is placed on a seat it will be found

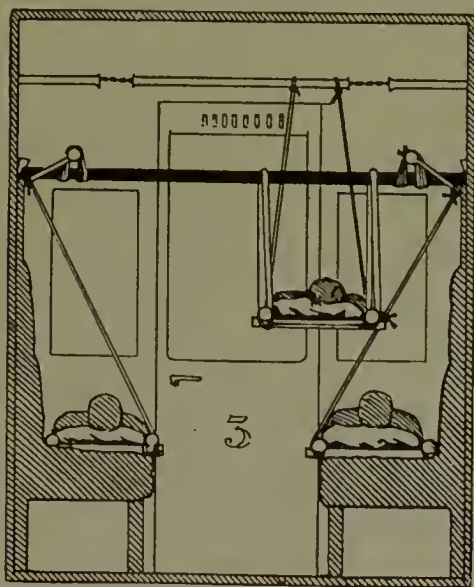


Fig. 136.—Improvised stretchers on seats of railway carriage; outer pole supported by ropes tied to brackets of racks. From each of the two dark poles a stretcher is slung. View in section.

to be too wide for the seat (which is but 1 foot 6 to 7 inches in width). However, by using ropes passed round the outside poles or handles of the stretcher and carried up to the rack pole or the rack brackets, the stretcher is prevented from slipping off the seat and is securely held in place. In these third (and second) class carriages a third stretcher can be slung by resting the poles on the luggage racks (*see* Fig. 136) as follows:—

In all carriages a notice is affixed stating that heavy goods must not be placed on the racks, and it would seem at first glance as though they were not considered strong enough to support a loaded stretcher. It is, however, when heavy articles are placed in the centre of the rack that there is danger of the rack falling. This is owing to the fact that the rack poles are not let into a slot on the side of the carriage, but only supported by a ring and screwed bolt. When pressure is brought to bear on the centre of the rack pole the ends pull away from the carriage side, slip from the metal rings, and are then only supported by the brackets. If, however, as in the case of poles placed to sling a stretcher, the weight upon the rack poles falls close to either end, there is no danger of the poles pulling away from the carriage side and slipping from the metal rings. This has been tried and found satisfactory, and the chief railway authorities maintain that with the weight at either end of the rack there is sufficient support to carry a loaded stretcher safely.

One stretcher only is slung, and it is placed towards one side of the carriage to allow the attendant bearer to pass along the carriage whilst attending the men on the upper or lower stretchers. (Fig. 136.)

If additional security is required, the poles of the stretcher may be passed underneath the rack pole through the webbing of the rack and rested upon the projecting piece of beading at the back of the rack. When the pole is placed thus, a wedge of wood can be driven in between the pole end and the carriage wall from the top downwards. The pole as it passes beneath the rack pole may be lashed to the rack pole, thus giving a still greater security. In addition, string may be passed from the stretcher poles round the tube which

contains the communication cord on either side of the carriage. Further, string can be fixed to the ventilator above either doorway to prevent swaying, and even the ventilator in the roof may be utilised by passing string from the stretcher poles through the apertures and fastening them. Finally, to prevent swaying, the poles of the stretcher which is slung may be tied to the cords by which the stretchers on the seats are lashed to the rack. (Fig. 136.)

REMOVAL FROM RAILWAY TO GENERAL HOSPITAL

The sick and wounded, on arrival at the end of their railway journey, have to be conveyed by ambulance waggons or other vehicles to the General Hospitals.

At the station terminus delay from want of transport may again occur, and it may be necessary to form a temporary hospital in goods or wagon sheds or other suitable adjacent buildings.

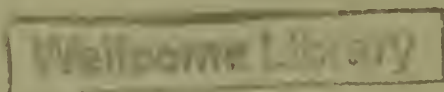
During the stay of the sick and wounded at Stationary Hospitals, in their conveyance by rail, and wherever else a delay may occur, it is the duty of surgeons, bearers, and nurses to provide food and to attend to the surgical and medical wants of those under their charge.

The General Hospital at the base should, as far as possible, assist the Voluntary Aid Detachment by meeting trains as they arrive, and getting together such improvised help as may be required.

Finally, the wounded man is taken to hospital, and for the first time the bearers of the Voluntary Aid Detachments may have to carry loaded stretchers upstairs. As a rule, patients should be carried upstairs head first; except under special circumstances, such as in fractures of the lower extremities, when the patients are carried feet first, that rule is to be observed.

When the bearers arrive in the ward of a hospital quietness must be maintained while they carry the stretcher to the foot of, and in line with, the bed, with the head toward the bed. The bearers then lift

the patient as for unloading stretchers, but stand up, lifting the patient, and carry him over the foot and place him in the centre of the bed. The patient is now in the charge of the staff of the General Hospital. The stretcher is quietly removed from the ward, and outside the hospital it is closed.



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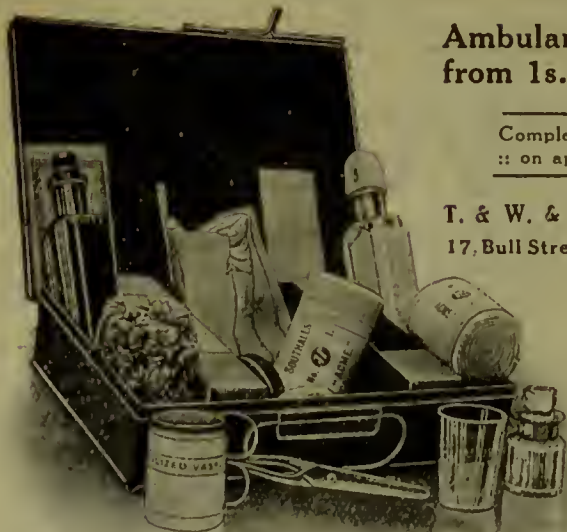
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